

MUNICIPAL M JOURNAL

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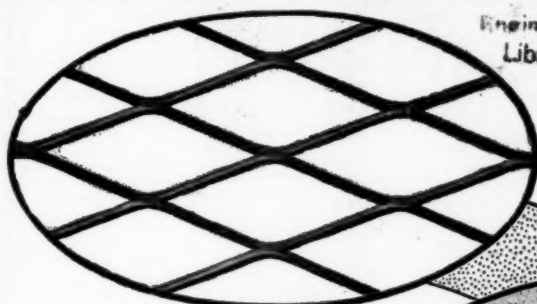
WEEKLY

VOLUME XLIV, No. 7
FEBRUARY 16, 1918

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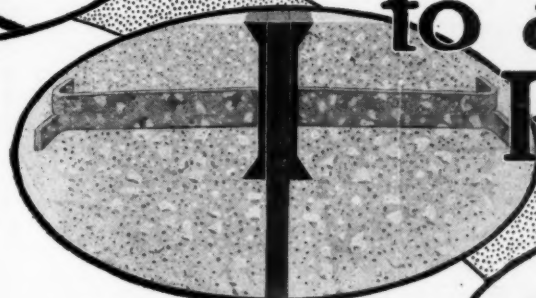
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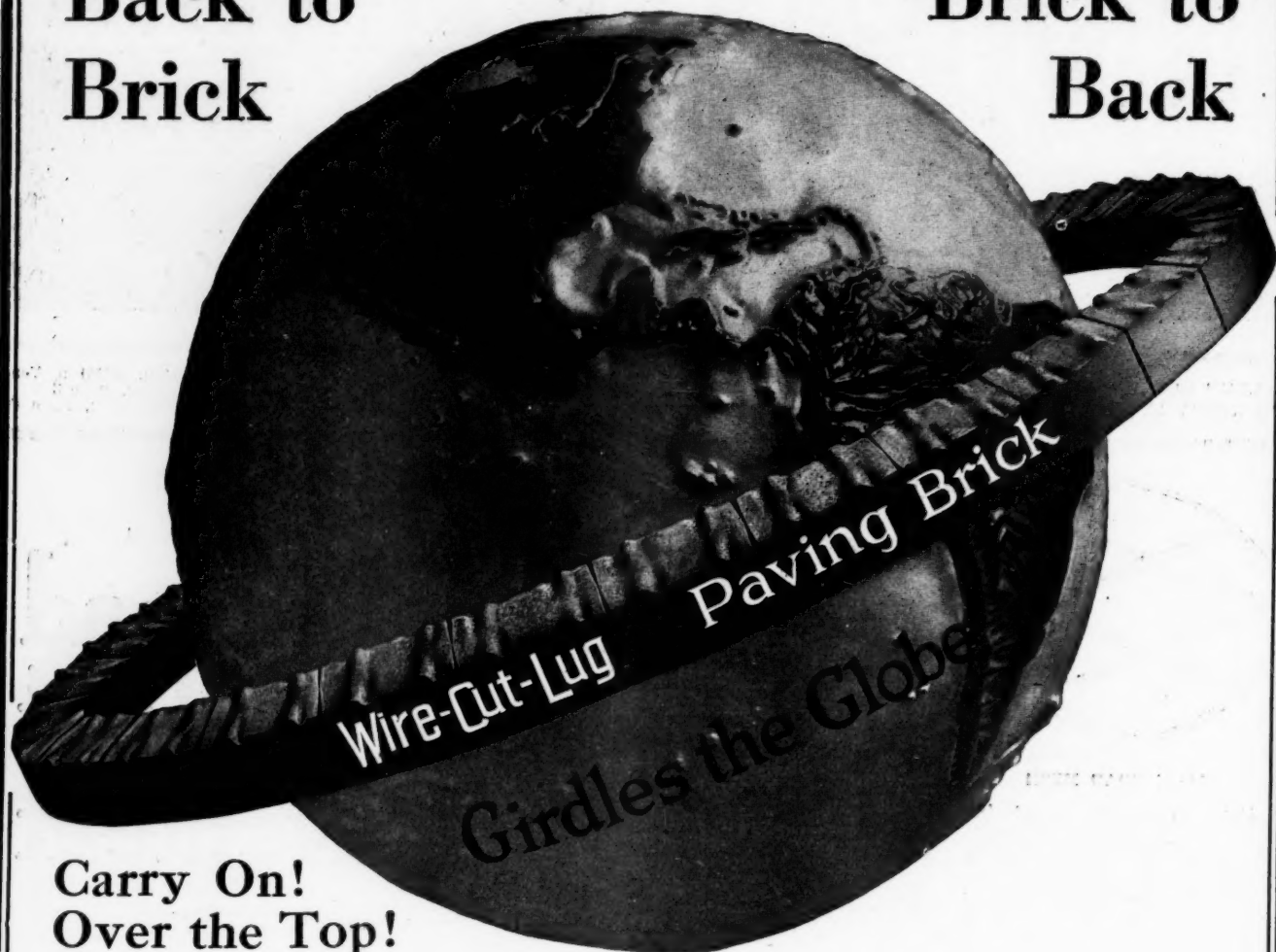
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**Back to
Brick**

— AND THE —

**Brick to
Back**



**Carry On!
Over the Top!**

Transportation is the crux of the situation.
**THE ROAD TO VICTORY IS PAVED
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Success is getting there first—fully equipped.

Mobility means "getting the jump" on the enemy.

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Made by 48 independent companies in 12 states.

Write for data.

The Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

(Licensors of Manufacturers)

Municipal Journal

Volume XLIV.

NEW YORK, FEBRUARY 16, 1918

No. 7

SNOW REMOVAL ON PENNSYLVANIA HIGHWAYS

How the State Highway Department, Through Its Maintenance Division, Is Keeping Open, for the United States Army Transport Trucks, Two Hundred and Twenty-five Miles of Roads Under Unprecedented Conditions.

By GEORGE H. BILES.*

Pennsylvania is co-operating with the national government in keeping an artery of travel across the state open and free from snow for the United States army transport trains operating between the central west and the seaboard. This route in our state extends from the Ohio state line, via Beaver Falls, Pittsburgh, Greensburg, Bedford, McConnellsburg, Chambersburg, Gettysburg and Littlestown, to the Maryland state line, a distance of approximately two hundred and twenty-five miles.

A system of operation for handling this work has been established by the Maintenance Division of the State Highway Department, which will be described briefly.

tendent of highways of the county, who has charge of all maintenance work; and under these men come the gang foremen, patrolmen, labor, etc. This organization has complete charge of this work in their respective counties and is under the direction of the second deputy commissioner in charge of maintenance.

Stationed at the larger towns, along the line of this route, are motor trucks equipped with snowplow attachments, road machines, drags, shovels, etc. The patrol system of about thirty-four men is engaged continuously in repairing and patrolling this highway, each man looking after his particular section, and this plan is a most



GASOLINE TRACTOR PULLING ROAD MACHINE.



MOTOR TRUCK USING SNOW PLOW.



HAND SHOVELING AS FORMERLY PRACTICED.



"CLOSE-UP" OF TRUCK WITH PLOW ATTACHED.

Through arrangements made with the weather bureau office at Pittsburgh, weather forecasts are wired to the main office of the State Highway Department by which conditions can be anticipated and instructions issued immediately to the various districts to organize men and equipment for action. The field organization of the State Highway Department consists of the assistant engineer, who has control of all work in several counties, usually about five in number, followed by the superin-

*Second Deputy State Highway Commissioner of Pennsylvania.

important factor in reporting emergency conditions of consequence to the district head or superintendent, who reports by wire or phone to the main office direct. The caretaker is empowered to organize forces, if need be, to take care of conditions until the arrival of the superintendent. If the conditions are unusual, the superintendent reports by phone to the assistant engineer, who arranges to inspect and handle the work accordingly.

The report made by the caretaker is either by wire or telegram, which is followed by a postal-card report form, giving details, and addressed to the main office at Harris-



A CUT THAT REQUIRES CONSTANT VIGILANCE.

burg. This information is charted as soon as received and the same practice is followed upon the completion of the work. If the drifts are abnormal and the road is not opened within twenty-four hours, the office must be advised by wire, and in this way headquarters is in direct touch and control of the entire route at all times.

The first snow storm of consequence this winter occurred December 7th and 8th and was general over the entire route and for many miles drifts averaged three to six feet in depth. The work was begun by breaking a track through the drifts with teams and drags. This was followed by the road machines, or trucks with the plow attachments and shovelers. Turn-outs were made along the line and thereafter the road widened out to a width of between fourteen and sixteen feet, depending upon the location. The entire travelable width of roadway was finally opened in order that traffic would not track and cut through the road surface during periods of freezing and thawing. The snow at first was removed to within three inches of the road surface and what did not melt was afterward removed entirely. Through the deep cuts, after a track was broken, it was necessary to resort to shoveling.

As soon as any section of the road was opened, shovelers followed, cutting openings from the side to the ditches at various intervals along the road. When this work was completed, the road was again turned over to the caretaker, or patrolman, to look after the drainage details.

From observations taken since 1913, it has been found that at certain locations the construction of snow fences would be advantageous and economical and whereas it was impossible to put all the necessary fence in place this season, some of it has been constructed and before another season arrives, the remaining sections will be provided for.

There were certain sections along the line of the route where it became necessary to work night and day shifts, and since the organization was perfected, each succeeding storm has been handled with increased alacrity and efficiency.

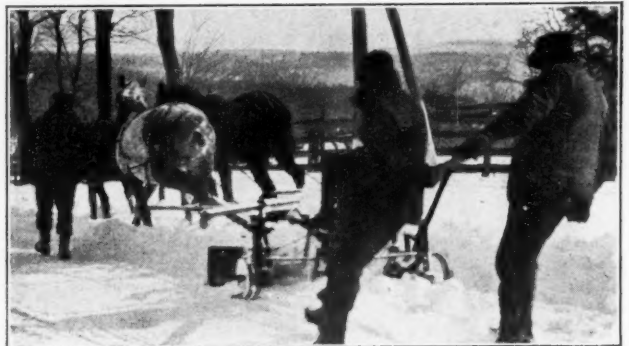
In the beginning, the work was handled with the following organization and equipment, which has been augmented from time to time: 7 motor trucks and plows, 22 road machines, 20 drags, 105 teams, 3 tractors, and 200 men.

ROAD MAINTENANCE IN WISCONSIN.

The year 1917 showed considerable progress made by the state of Wisconsin toward securing better highways. Largely through the activities of the Good Roads Association, a State Trunk Highway Act was passed, and an amendment of the State Aid Law permitting the use of state aid on city streets, and another amendment providing that fifty per cent of the state-aid money, together with local money accruing under the State Aid Act, shall be expended in the construction of the state trunk highway system.

The State Trunk Highway Act was designed to secure

a state highway system which has already been laid out and totals approximately 5,000 miles, connecting all county seats and cities of 5,000 and more. It requires that the state begin this year patrol maintenance of the entire 5,000 miles—not only the improved portions but also those that as yet have not been improved. The state highway engineer, A. R. Hirst, has worked out a system of thoroughly centralized supervision and coordinated execution of this patrol work. The patrolmen will be provided with teams or motor trucks, light road graders, and the regular equipment of small appliances. Their duties in the case of unimproved roads will be to drag those that as yet have not been improved. The state highway engineer, A. R. Hirst, has worked out a system of thoroughly centralized supervision and coordinated execution of this patrol work. The patrolmen will be provided with teams or motor trucks, light road graders, and the regular equipment of small appliances. Their duties in the case of unimproved roads will be to drag those that as yet have not been improved. The state highway engineer, A. R. Hirst, has worked out a system of thoroughly centralized supervision and coordinated execution of this patrol work. The patrolmen will be provided with teams or motor trucks, light road graders, and the regular equipment of small appliances. Their duties in the case of unimproved roads will be to drag those that as yet have not been improved. It is planned to begin patrol work of the roads next May.



SMALL ROAD MACHINE USED ON LIGHT SNOW.

Another feature of the bill is the road marking. The traffic highways will be numbered and signs giving the number of the road will be placed throughout the system, and the state will issue a map showing the location and number of each road in the system.

For building this system, it is proposed to spend nine million dollars for the period ending July, 1921, with which it is expected that one-fourth of the system can be built.

Another law, which becomes effective January 1, 1919, is known as the "Wide Sleigh Law" and provides that no draft sleigh shall be manufactured or sold unless the distance between runners measures 4 ft. 6 in. from center to center.

MUNICIPAL MANUFACTURE OF MATERIALS.

Some of the officials and official bodies of Detroit, Mich., are considering the advisability of having the city manufacture brick and creosoted wood paving blocks, a part, at least, of the brick to be used for constructing sewers. The city clerk, Richard Lindsay, declared a few days ago that the city was at the mercy of a brick makers' ring and that the only method by which it could secure fair prices for sewer construction appeared to be by manufacturing its own brick. (No suggestion appears to have been made that concrete be substituted for brick, although a much greater number of large sewers have been built during recent years of the former than of the latter material.) In addition, the charter commission, in its draft of the chapter to govern the department of public works, has provided that the city may enter into the business of manufacturing brick and creosoted wood blocks, and may erect and maintain a garbage disposal plant. The commission suggested that making bricks and paving blocks would enable the city to keep all employees of the public works department at work during the winter months.

PROGRAMS FOR WAR ROADS

Selecting Roads That Are Most Essential—Saving Time in Construction—Type of Pavement—Traffic to Be Carried.

In a paper before the convention of the American Road Builders' Association, Geo. C. Diehl, county engineer of Erie Co., N. Y., and chairman of the Good Roads Board of the American Automobile Association, gave some very timely suggestions for the preparation of a program for highways which will assist in the war preparation of the United States, the title of the paper being "How to Lay Out and Justify a Program of War Roads." This paper is abstracted below:

To justify any construction program, it is necessary that such construction will help win the war. Road construction projects from this point of view may be divided into three classes. First: Those which assist in the war program; second: Those which retard the war program; third: Those which do not interfere with the war program. There are many ways in which roads may assist, but to simplify this discussion, only the view point of how highways can assist the railroads was considered. A vital problem at present is how haulage over roads can be employed to release locomotives and cars and relieve congestion at terminals and freight houses.

Under the first class might be included roads that radiate from railroad shipping points and those that parallel railroad lines. As railroads are already over-crowded, the radiating roads, which serve as feeders, are not urgently needed, and the principal effort should be to concentrate on roads that approximately parallel railroads.

To even superficially study the subject, it is necessary to assume a period for the duration of the war, for it is apparent that if the war is to end within a year the im-



HEAVY PLANK DRAG USED TO BREAK THE FIRST TRACK IN SNOW DRIFTS.

provement of these parallel roads should be temporary and speedy, letting the permanent improvement wait. One Congressman wisely said that it is far better to prepare for a war of seven years and have it last seven months than to prepare for a seven months' war and have it last seven years. It would seem wise to assume that the war will last for three years or more, and therefore to construct the parallel roads in the most substantial and durable manner.

In deciding upon the roads to be so improved, it is necessary to fix the approximate length of motor vehicle haul. This has been stated by individuals to be from 50 miles upward. The daily distance for motor vehicle parcel post delivery is 135 miles, and it is likely that 150 miles daily would be a safe figure on which to base calculations. War roads, therefore, would not be continuously improved across the country, but by overlapping of zones of local service there would be improved stretches for four or five hundred miles. There would probably be some special roads of greater length, for example, from

Detroit, Mich., to the Atlantic seaboard, for the transportation of motor trucks to be used by the government.

Elements which enter into this problem include availability of local material, time required for construction, ability to provide suitable detours, and the number of cars and locomotives that would be released.

It is apparent that, if two roads are of equal length and their conditions are equal, that which can be built of local material without using railroad haulage would be the more desirable. Also, the road which could be built in the shorter time would be preferred.

It may be assumed that these highways will be used only for local travel and not for through travel. The traffic carried may be divided into passenger, freight, express, and mail. The possibilities of moving passengers by motor vehicles are almost unlimited, as there are today more than 4,000,000 passenger cars in this country, which would give a total greater capacity of passenger-miles than all coaches of the steam and electric railroads combined.

Greatest relief to the railroads can be provided where the centers of population, production and distribution are close together, which is the condition in the New England, Eastern and Atlantic seaboard states. It is now possible to motorize the local passenger business in many sections of the east. This would eliminate possibly 75% or more of the local passenger trains in that section; and if through passenger trains refused to carry local passengers, a considerable percentage of through trains would be eliminated. Local freight, especially the smaller units, could likewise be transported by motor. Local express and mail packages could be carried over the highways and thus greatly relieve the railroads.

Many elements must be considered to determine which roads would give the greatest relief per dollar expended and in the shortest time. It is suggested that the state highway commissioner in each state determine the sections of highways which would best serve this purpose, consulting for this purpose a committee consisting of a leading railroad official, who would be in possession of all facts pertaining to the character and volume of local freight and passenger business, and a representative from chambers of commerce or commercial bodies. This committee, cooperating with the Highways Industries Committee (whose organization was effected last month in Chicago), could ascertain, with reasonable exactness and in a very brief time the highway construction that would afford the greatest relief. The reports of the several state highway commissioners could then be transmitted to the Highways Transport Committee or suitable federal authorities, who would definitely determine which sections of highway should be built. The state highway commissioner could then promptly proceed to prepare plans, advertise for bids and let the work, all the govern-



ROAD MACHINE DRAWN BY TEN HORSES.

ment agencies cooperating toward a maximum speeding up of road construction.

One method of saving time would be to eliminate the preliminary surveys used for computing the amount of earth-work, and estimating this instead. Preliminary surveys could be simplified, particularly in states where the country traversed is comparatively level, final grades frequently being established just before construction begins.

After the locations of war roads are fixed, it is important that the most durable types of construction be adopted, as the number and weight of vehicles are sure to increase enormously, possibly carrying more freight than that carried by the railroads. On the main roads, it is altogether likely that the types will be limited to reinforced concrete, monolithic brick on concrete base, and possibly bituminous concrete. The various other forms of broken stone roads will not be suitable on the main highways. Without going into detail, reports of the cost of maintenance of various state highway commissions, where great mileages of roads have been constructed, substantiate this last statement.

For such highways, widths heretofore adopted will prove inadequate. Three-ton trucks traveling at 15 miles an hour or a half-minute headway, would convey 3,600 tons in one direction in a 10-hour day, or 7,200 tons in both directions. This is only the amount carried by one or two modern freight trains, and it would seem necessary to provide for two lines of traffic in each direction. Types which readily lend themselves to widening should be adopted, as much widening will be done in the future and the expense of this should be reduced to a minimum. Preference must be given to roads that do not require resurfacing or frequent repairs, as the war roads must not be closed.

For intelligently designing highways as well as bridges, maximum loadings must be adopted, this including not only total load but wheel load and length of wheel base. Motor vehicle manufacturers could then construct cars consistent with such system of loading, and cities and states would be warranted in forbidding travel over highways and bridges which did not conform to such system.

Cost of highway construction bears a definite relation to tonnage. If enormous increase is contemplated in the latter, the public must be prepared for highway expenditures far in excess of those of previous years, particularly in the case of the main trunk lines.

Highways must be kept free from obstruction caused by snow, as the roads must be used every day in the year. A comprehensive handling of the snow problem is a task too large for the average town, and this should be undertaken by the county or state. Similarly the taxable assets in the several townships are not sufficient to provide the amounts required to maintain such highways and bridges, and it is becoming apparent that the township should be abolished as a unit of highway administration, leaving the state and county to carry on work outside of incorporated places.

Economic theories of railroad construction have been so developed that it is possible for a railroad to determine the exact expenditure that would be justified to eliminate a foot of rise and fall or a degree of curvature, and if the highways are to carry the enormous motor vehicle travel which is anticipated, then similar economic theories should be developed for them. To illustrate: On a highway that carries 2,000 3-ton trucks daily at a rate of 6¢ a ton-mile, the cost of haulage would amount to \$360 for each mile per day. If the highway were lengthened 1 mile, the increased cost of hauling would therefore amount to upwards of \$125,000 a year, which capitalized

at 8% for sinking fund and interest charges, would justify an expenditure of \$1,500,000.

Before adopting a maximum grade, it would be necessary to determine whether trailers were to be used, and if so, the total weight of the trailers and loads as compared with the tractor. It does not seem practicable to reduce maximum grades to 0.5 ft. per hundred feet, as on railroads, but, on the other hand, distances can be saved by accepting a higher maximum grade. As an illustration, the distance from Albany, N. Y., to Pittsfield, Mass., is 50 miles by rail but only 38 miles by highway.

A traffic census should be taken at frequent intervals, as a controlling factor in many cases will be the cost of moving a ton a mile. Charts can be prepared showing the relation and classes of traffic in proportion to population and amounts of production. The curves on charts prepared in states where improved highways are more prevalent would indicate to a considerable extent the type of construction, width, grades, alignment, etc.

With such a highway program, production would be greatly stimulated and territory not now available for agriculture would be opened up and economic conditions bettered along many lines. While it is impossible in the rapid building of war roads to adhere closely to the lines indicated, yet all of these matters should be kept in mind.

REPAIRING BITUMINOUS PAVEMENTS.

Editor Municipal Journal, New York City:

Dear Sir—On Feb. 2nd you published an abstract of a paper by Geo. H. Biles, Sec. Deputy Highway Commissioner of Penn., concerning Repairing Bituminous Pavements.

Under the head of "Bituminous Concrete," the article states that "cracks are the most common and earliest defects appearing in bituminous concrete pavements." It seems to me that this statement can be further emphasized. In pavements of this type, properly designed and constructed, cracks constitute at least 90 per cent. of all defects. In our 32 miles of this type of pavement we have experienced practically no other trouble, except in a very few cases where the asphaltic concrete has pushed under traffic. The pavement on those streets where the pushing has occurred was some of the first laid in Oak Park, and the so-called "Topeka mixture" was used. These streets have been subjected to heavy motor truck traffic. The one exception is a boulevard pavement carrying excessive, concentrated motor traffic, and has been down four and a half years. This pavement has developed a tendency to push slightly at several points throughout its length; in each case this pushing has appeared in the tracks of both east and west bound traffic.

We have examined the condition of concrete base beneath a representative number of cracks (both very marked and very small cracks being chosen) in all parts of the town, and in every case found a crack in concrete base either directly under that in the surface material or only a very slight distance therefrom. It is our belief that in at least 98 per cent. of these cases a crack in asphaltic wearing surface means a crack in concrete base, directly beneath or in close proximity. This statement is substantiated by practically all asphalt pavement authorities in the country, both engineers and contractors.

In no case have any of our asphaltic concrete pavements laid on macadam base developed cracks, including pavements 7 years old.

The cause of cracks in asphaltic wearing surface is undoubtedly in the base, provided the mixture carries a reasonably correct amount of bitumen and is properly mixed and placed, except in those very rare instances where some local case of improper drainage or defective support may cause cracking, and, of course, in pavements which have served their time without resurfacing. Just so long as asphaltic wearing surfaces are laid on concrete base will they crack; and there is apparently no effective way of overcoming this tendency, or of permanently repairing such cracks.

Mr. Biles says that "cracks, unless caused by some serious form of disintegration, can be repaired by cleaning them out thoroughly and pouring them full of hot or cold bituminous mixture of proper grade and then tamping

or wedging stone chips into the cracks, thoroughly sealing them." Perhaps this method would work out in those extremely rare cases where cracks occur in pavements on macadam base, but it certainly will not give the desired result in cracks due to cracks in concrete base, simply because the wearing course, owing to its mechanical bond with the concrete, has no chance to recover from the shock of the pulling action, and therefore must crack. We have tried this scheme in many instances and it has not given good results. We have also cut out and relaid the surface material, only to find after another winter that the crack had reappeared, and in many cases a crack appeared at both edges of the patch. We have also cut out and relaid both base and top and in practically every case found that a crack appeared at both edges of the patch.

We have seen the rolling of wavy surfaces during hot weather (recommended by Mr. Biles in some cases) tried in our own city, also in other cities; and while temporary relief was perhaps obtained, the waves reappeared as soon as traffic had been resumed for any length of time.

Mr. Biles recommends a light surface application of bitumen on pavements which have begun to lose their "life." This we believe is very practicable and will give good results, though there is still doubt as to just what grade of oil to use, in order to get the best results at a minimum cost.

Very truly yours,

H. W. SKIDMORE,
Construction Engineer,
Dept. Public Works, Oak Park, Ill.

CONVENTION OF AMERICAN ROAD BUILDERS' ASSOCIATION

Narrative of the Fifteenth Annual Meeting Held at St. Louis Last Week—Road Building as a War Measure—Federal Government Urged to Formulate Definite Road Policy—Snow Removal Essential.

The fifteenth annual convention of the American Road Builders' Association was called to order promptly on time at 10.30 A. M., February 4th, although the tie-up caused by snow in the north and east delayed the arrival of many. Before the end of the convention, about 550 had registered. With a few exceptions, the program was carried out as published and most of the papers received animated discussion. That the papers would be of high quality was indicated by the names of their authors.

The keynote of the convention was the continued building of roads as a war measure. Nearly all the speakers strongly urged speeding up the building of such main roads as will aid in winning the war by (1).—Furnishing continuous routes for delivery of auto-trucks and their loads of auto cars and for war materials under their own power from the factories to the point of shipment, as outlined by Raymond Beck of the Highways Transport Committee, one of whose duties is the selection of such routes and the securing from state and county highway authorities the construction or temporary repair of miles of roads needed to fill the gaps in the most valuable routes.

(2).—Constructing of roads that will relieve the railroads of local freight, passenger, express and mail traffic, so that they can apply themselves to the handling of through traffic, applying this most intensively near the port terminals so as to relieve the freight stations, docks and warehouses at the railroad terminals at shipping points.

(3).—Constructing such local roads as can be constructed with local materials and machinery which will not tax the railroads for delivery.

The fact that these roads are in many cases directly for military purposes, and in other cases indirectly so by relieving the congestion caused by military usage of these and other transportation systems, warrants asking the aid of the national government in many cases, and a plan for making the application of this aid most efficient, economical and speedy, was outlined in Mr. Diehl's paper.

The importance of the motor truck as an emergency method of relieving traffic congestion was strongly emphasized and the probable development of the use of motor trucks for deliveries from factory or central distribution points for farm purposes to store or consumer was quite clearly outlined.

The matters of width of highway, economical size of truck, coordination of truck, tire and road design, were all recognized as matters of prime importance, and methods of securing the cooperation of road engineers, truck manufacturers and truck users in fixing the charac-

ter of pavement, size and design of truck, and speed and regulations of the same were quite thoroughly discussed. Traffic regulation came under this head and, after some valuable discussion of Mr. McLean's important paper, a special committee was appointed to consider the formulation of uniform traffic regulations for all the states, with instructions to report to this convention if possible.

While the general construction of roads in accordance with former programs was not recommended, the extensive construction of such roads as are important in winning the war, either directly or indirectly, was strongly urged, and the securing of government and state aid therefor. Also the preparation of plans and programs for more general road construction as soon as the war is over was strongly recommended. Mr. Bradt's paper outlined the Illinois plan, under which it is proposed to carry and redeem the \$60,000,000 bonds to be issued for road construction out of the proceeds of automobile licenses, already increased with this purpose in view. Texas counties reported similar plans and Kansas has many contracts ready for letting, few of which, however, will actually be constructed until after the war.

The exhibit feature of the convention was much smaller than usual, this being intentionally so on account of the present difficulties of transportation and the desire to keep down comparatively unnecessary expenses. The ball-room of the Statler Hotel, in which the convention was held, was neatly laid out in booths in which samples and literature were exhibited and which were used as centers for the representatives of the manufacturers who were on hand.

The first session, Friday morning, was devoted to addresses of welcome, by X. P. Wilfley (representing Governor Gardner) for the state of Missouri, Mayor Kiel in behalf of the city, Geo. D. Markham for the Chamber of Commerce, and A. C. McKibbin for the Missouri State Highway Board; which welcoming speeches were responded to by H. E. Breed, president of the association.

In the afternoon, W. A. McLean, deputy minister of highways of the Province of Ontario, reading a paper entitled "Traffic Laws in Relation to Highway Maintenance and Construction," which was followed by a brief discussion. "The Illinois Scheme of Financing by Bond Issue" was described by S. E. Bradt, superintendent of highways of Illinois. (This scheme was described in the issue of Municipal Journal for November 15th, 1917.) The evening session was devoted largely to screen pictures illustrating "The Roads in the Hudson River District with Unusual Construction Features," which were described by W. A. Welch, chief engineer, Palisades

Interstate Park Commission; "Road Construction in the Northeast Cantonments," described by Philip P. Sharples, manager of the General Tarvia Dept. of the Barrett Co.; and "Road Construction in the Other Cantonments" by A. N. Johnson, consulting engineer of the Portland Cement Association.

Tuesday morning, three papers were on the program, but one of them—"The Efficiency of the Motor Truck in Terms of Cost Per Ton-Mile" by R. E. Chamberlain—was not read until Wednesday. S. M. Williams, sales manager for the Garford Motor Truck Co., presented a paper entitled "The Highway and Its Relation to Transportation," which was read by A. E. Phelps. "The Delivery of the Motor Truck from the Factory to the Seaboard Under Its Own Power" was described by Raymond Beck of the Highways Transport Committee.

Tuesday afternoon Geo. C. Diehl, county engineer of Erie Co., N. Y., and chairman of the Good Roads Board of the American Automobile Assn., gave some suggestions on "How to Lay Out and Justify a Program for War Roads," and J. C. Travilla, consulting engineer for the Dunn Wire-Cut Lug Brick Co., discussed "The Creation of a More Equitable Contract Between Highway Commissions and Contractors." Following this session there was a meeting of the Board of Directors of the Association and in the evening an entertainment and smoker in the hotel.

The last two days of the Congress were devoted to details of design, construction and maintenance. The practical papers of state highway engineers Older of Illinois, Upham of Delaware, Graham of Missouri, and chief engineers Fisk of St. Louis and Dunning of Ft. Oglethorpe were fruitful of discussion and filled their respective sessions full of interest. The motion picture exhibits were interesting as well as entertaining and the banquet crystallized the patriotic sentiment of the organization, though largely expressed through local speakers, who included banker Edward Hidden as toastmaster, postmaster Collin M. Selph, Capt. Roy Britain, editor Geo. S. Johns of the "Post-Dispatch," and secretary A. Campbell McKibbin of the Missouri State Highway Board. Of special note was the inspiring patriotic address of W. A. McLean, the deputy highway commissioner of Ontario, and the brief closing note of Mayor Holmes of Worcester.

The resolutions adopted by the Congress were brief and showed the strong intent of the organization and its members to support the Government in the present stress, suggesting some ways in which the organization and the official national and state organizations can be of service in the transportation problems within the country.

The principal resolutions regarding the policy of the Government in encouraging construction and adequate maintenance of roads essential to the progress of commerce directly in aid of the winning of the war; regarding snow removal and regarding uniformity of road signs are given below. The committees provided for have power to promote the adoption of their plans as soon as they are formulated so as to extend uniformity of treatment of these subjects as rapidly as possible among the States of the Union.

A strong resolution endorsing the methods of conduct of the war by the Administration and pledging the aid of the organization and its individual members passed unanimously and enthusiastically.

There were the usual resolutions offering thanks for courtesies and one accepting an invitation from the Governor of Arkansas to attend the U. S. Good Roads Association meeting in Little Rock, April 15-19.

A committee of five on uniformity of regulations of traffic was appointed to confer with state authorities and

to study and work out as rapidly as possible recommendations to state authorities of uniform regulations of speeds, weights, dimensions, wheel weights, tires, chains, lights, etc.; reports to be made to the state authorities and to the Association. Meeker of New Jersey was made chairman, and Terrell, Potts, McLean and Rountree are the other members.

Resolutions Adopted by the Association.

WHEREAS, highway transportation has become a vital factor in the transportation facilities of the nation where suitable roads for its use exist, and

WHEREAS, the present use of this means of transportation will be greatly curtailed and an enormous road investment loss be sustained unless said roads are properly maintained, connected and extended, and

WHEREAS, the extension of this mode of transportation would afford much needed relief during periods of railroad congestion and facilitate the transportation of war and other necessities, and

WHEREAS, funds have been made available by federal, state and county appropriations for use in maintenance of public roads, and

WHEREAS, in order that full efficiency of roads already constructed may be attained, it is necessary that certain connecting links and extensions be built, and

WHEREAS, in order that the expenditure of these funds may be so directed as to yield the greatest measure of service to the nation in the present crisis, and

WHEREAS, both maintenance and construction of roads depend largely upon the movement of materials over the railroads and the road-building policy of the Federal government,

NOW, THEREFORE, BE IT

RESOLVED, that the American Road Builders' Association Convention urge upon the Federal government that it formulate or cause to be formulated and promulgated at the earliest possible date a definite statement of Federal policy concerning road maintenance and essential construction and the encouragement and aid which the Federal government, by assigning freight car service will give towards carrying out the plans recommended by the different states through their highway officials during the season of 1918. And be it further

RESOLVED, that this Association, through its Executive Committee, does hereby tender its full cooperation and assistance in carrying out such a road policy. And be it further

RESOLVED, that a standing committee of seven (7), of which the President shall be a member and Chairman, appointed by the President from the members of this Association representing all sections of the United States, be appointed to present these resolutions to and confer with Secretary-Treasurer McAdoo, the Director-General of Railways, and they shall continue their activities on these lines until discharged by this Association and shall report from time to time in order that their information shall be available to the membership of this Association.

WHEREAS, in the present national crisis it is necessary that all transportation facilities be utilized to the fullest extent, and

WHEREAS, maximum efficiency in highway transportation in many sections of the United States is not possible at the present time on account of snow blockades, therefore be it

RESOLVED, that it is the sense of this convention that provision should be made and funds provided for the necessary snow removal during the winter of 1918-1919 on trunk lines connecting large cities or industrial plants and on other roads which carry a heavy motor truck traffic. And be it further

RESOLVED, that copies of these resolutions be forwarded to the Department of Agriculture of the Federal government, to the Governor and the State Highway Department of each state so affected.

WHEREAS, there is a general need in the United States for the erection of highway signs and for a more comprehensive and uniform system of marking roads, both as to directional and precautionary signs, therefore be it

RESOLVED, that a committee of seven (7) be appointed by the President to take up and study this question, and to submit a report with recommendations at a subsequent meeting of this Association.

STREET PAVING DURING 1917

Annual Presentation of Data Concerning Paving Done by Cities—Furnished Specially for These Tables
by Officials of Six Hundred Cities—Amount, Construction Details and Cost of
Pavements—Paving Materials Locally Available.

ROAD MATERIALS LOCALLY AVAILABLE.

City and State.	Distance in miles to nearest adequate source (excluding railroad haul) for			Are Roads Suitable for Motor Truck Transportation?	City and State.	Distance in miles to nearest adequate source (excluding railroad haul) for			Are Roads Suitable for Motor Truck Transportation?
	Sand	Gravel	Crushed Stone			Sand	Gravel	Crushed Stone	
Alabama:					Illinois (Continued):				
Dothan	120	120	...	soon; not yet	Chicago Heights...	20	20	6	Yes
Florence	1½	1½	...	Yes	Cicero	2	2	2	Yes
Gadsden	2	1	1	Yes	Collinsville	1¼	1¼	½	Yes
Huntsville	None nearby	1-5	2	No	Decatur	2	2	None	Yes
Montgomery	1	2	...	Yes	DeKalb	No local materials	available		
Selma	52	1	None	Yes	Dixon	1½-2	1½-2	½-1½	Yes
Troy	1	52	150	Yes	E. St. Louis	3	...	7	Yes
Tuscaloosa	1	1	None	Yes	Evanston	No suitable local material			
Arizona:					Freeport	None	None	Quarry in city	Yes
Globe	½	½	None	Yes	Gibson City	20	20	75	No
Nogales	1	None	¾	Yes	Gillespie	3	3	...	Yes
Phoenix	2	2	2	Yes	Granite	in city	in city	in city	...
Arkansas:					Highwood	¾	1½	½	Yes
Ft. Smith	½-1	½-1	½-1	Yes	La Grange	6	None	15	Yes
California:					Marion	60	...	...	No
Alameda	15	15	3	Yes	Moline	By river	2 mile haul	...	Yes
Berkeley	25	25	4	Yes	Normal	1½	...	...	Yes
Eureka	1½	10-15	6	Yes	Oak Park	40	8	8	some
Long Beach	30	30	30	excellent	Pekin	1	1	Must be shipped	Yes
Marysville	1	1	24	Yes	Peoria	2	2	2	Yes
Oakland	3	3	3	Yes	Pontiac	60	60	60	Yes
Pasadena	All secured in city			Yes	Springfield	All material shipped in			No
Petaluma	35	35	1½	Yes	Sterling	1	1	...	Yes
Pomona	1-1½	1-1½	...	Yes	Streator	1	1	1	Yes
Redlands	2	2	11	Yes	Waukegan	1½	1½	1½	Yes
Richmond	5	40	3	Yes	Indiana:				
Riverside	1	...	2	Yes	Anderson	¾	¾	...	Yes
San Bernardino	1-2	1-2	3	Yes	Crawfordsville	2	2	½	partly
San Francisco	5	...	...	Yes	Crown Point	50	50	50	Yes
San Jose	1-5	1-5	10-50	Yes	E. Chicago	20	20	20	Yes
Santa Ana	1½	1½	30	Yes	Ft. Wayne	1½	1½	1½	Yes
Santa Barbara	9	40	40	Yes	Frankfort	25	25	25	Yes
Santa Monica	40	...	10	Yes	Gary	7	7	30	good
Colorado:					Greencastle	2	2	¾	Yes
Boulder	1	...	1	Yes	Hartford City	1	1	8	Yes
Canon City	3½	3½	3½	Yes	Indianapolis	2	2	None	Yes
Colorado Springs	1	1	40	Yes	Kendallville	13	13	50	No
Ft. Collins	¾	¾	15	Yes	Madison	in city	in city	3	Yes
Leadville	2	2	½	Yes	New Albany	1	1	107	Yes
Pueblo	1	1	...	Yes	Noblesville	1	1	1	Yes
Connecticut:					Peru	1	1	1	Yes
Ansonia	1½	1½	by trolley	Yes	Portland	1	1	10	not for heavy trucks
Bristol	1	1	5	Yes	Richmond	2	2	6	Yes
Derby	1	1	by trolley	Yes	Seymour	3	3	11	Yes
Greenwich	½-1	½-1	½-1	Yes	Shelbyville	in city	2½	11	Yes
Hartford	2	10	5	Yes	South Bend	2½	2½	None	Yes
Middletown	1½	None	by trolley 8 mins.	Yes	Sullivan	10	10	None	Yes
New Haven	½	½	2	Yes	Terre Haute	2	2	...	Yes
Southington	1½	1	9	Yes	Iowa:				
Stamford	All by boat		...	Yes	Algona	1	None	None	Yes
Wallingford	1½	...	...	No	Ames	1½	1½	150	Yes, ex- cept for stone
Willimantic	1	...	...	Yes	Atlantic	1	1	1	...
Winchester	1½	1½	None available	Yes	Bloomfield	None available			
Delaware:					Boone	5	5	50	Yes
New Castle	1	2	7	Yes	Burlington	On river front		None near	Yes
Wilmington	None	None	3	Yes	Carroll	20	20	20	Fair
District of Columbia:					Cedar Falls	1	1	¾ to boats	Yes
Washington	3-8	...	...	Yes	Cedar Rapids	2	...	2	...
Florida:					Charles City	1	1	1	Yes
Palatka	¾	¾	...	Yes	Clinton	No hauling required			
Pensacola	Short	45	None available	Fair	Creston	No local material available			
Sanford	No local supplies				Davenport	River front	2	8	Yes
Georgia:					Denison	35	35	35	Yes
Americus	No local supplies				Dubuque	2	2	2	Yes
Athens	2	...	2	Yes	Eagle Grove	20	4	150	Yes
Rome	in city	in city	3	Yes	Emmetsburg	1	1	13	Yes
Savannah	3	150	150	No	Estherville	2	2	None	Yes
Idaho:					Fairfield	5	...	23	Yes
Boise	1	1	1	Yes	Fayette	3	none available		No
Coeur d'Alene	1	1	2	Yes	Ft. Dodge	2	2	None	Yes
Lewiston	1	1	1	...	Glenwood	30	30	40	No
Moscow	1½-3	90	10	only for sand	Grinnell	50	50	50	No
Pocatello	1	1	1	Yes	Independence	1	1	...	Yes
Twin Falls	None available		½	only for rock	Indianola	15	15	40-120	...
Illinois:					Iowa City	1-5	30	50	Yes
Alton	¾	12	¾	Yes mostly gravel	Marshalltown	½-3	½-3	None	Yes
Aurora	12	12	25	Yes	Monticello	2	scarce	3	Yes
Canton	½	½	½	Yes	Muscatine	1	1	1	Yes
Champaign	70	70	130	No	New Hampton	All materials shipped in			
Chicago	30	30	8	Yes, except sand	Perry	2	2	40	Yes
					Sioux City	All materials shipped 125 miles by rail			
					Spencer	2	2	2	Fair
Kansas:					Kansas:				
					Arkansas City	1	1½	None	No
					Atchison	1	1	...	Yes

ROAD MATERIALS LOCALLY AVAILABLE.

City and State.	Sand	Gravel	Crushed Stone	Distance in miles to nearest adequate source (excluding railroad haul) for	Are Roads Suitable for Motor Truck Transportation?
Kansas (Continued):					
Beloit	3	None	5		Fair
Cherryvale	$\frac{1}{2}$	$\frac{1}{2}$			Yes
Columbus	15-20	15-20	15-20		Yes
Council Grove	None	$\frac{3}{4}$	$\frac{3}{4}$		Yes
Emporia	$\frac{3}{4}$	3	$\frac{3}{4}$		Yes
Ft. Scott	None locally		1		Yes
Gerard	None locally		2		in dry weather
Gypsum	20	20			Yes
Independence	Shipped in		1-5		Yes
Iola	None	5-6	1		partly
Kansas City	$\frac{1}{2}$	None used	2		generally
Leavenworth	$\frac{1}{2}$ -3	None	1-3		in dry weather
Manhattan	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$		Yes
Neodesha			$\frac{3}{4}$		Yes
Olathe	20	150	1		Yes
Osawatomie			1		Yes
Ottawa	12	12	2		Yes
Parsons			$\frac{1}{2}$		for rock
Pratt	in city		None		Yes
Rosedale	3	1	1		Yes
Salina	2	None	here		for sand
Topeka	1	1	$\frac{1}{2}$		Yes
Wellington	13	35	25		dirt
Kentucky:					
Carlisle	$\frac{1}{2}$ -1 $\frac{1}{2}$	$\frac{1}{2}$ -1 $\frac{1}{2}$	75		Yes
Frankfort	28	$\frac{1}{2}$ -1 $\frac{1}{2}$	$\frac{1}{2}$ -1 $\frac{1}{2}$		Yes
Louisville	All available in city	limits			Yes
Ludlow	$\frac{1}{2}$	$\frac{1}{2}$			Yes
Madisonville	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Maysville	$\frac{1}{2}$	$\frac{1}{2}$	1		Yes
Paducah	Secured from Ohio	River			No
Louisiana:					
Kentwood	$\frac{1}{2}$	$\frac{1}{2}$	None		Yes
Lake Charles	75	75			No
New Orleans	All shipped in				
Natchitoches	55	55	50		No
Shreveport	2	2	2		Yes
Maine:					
Augusta	1	1-7	1-7		Yes
Bath	1	2	Imported		Yes
Gardiner	$\frac{1}{4}$	1	1		Possible
Lewiston	1	$\frac{1}{2}$	1		Yes
Portland	3	None	$\frac{3}{4}$		Yes
Rockland	2	2	$\frac{1}{2}$		Yes
So. Portland	1	1	None used		Yes
Waterville	$\frac{1}{2}$	$\frac{1}{2}$	Varies		Yes
Maryland:					
Cumberland	3	None	3		Yes
Frederick	1-2 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$ -3		Yes
Massachusetts:					
Adams	$\frac{1}{2}$ to $\frac{3}{4}$	$\frac{1}{2}$ to $\frac{3}{4}$	$\frac{1}{2}$ to $\frac{3}{4}$		Yes
Braintree	1	1	1-3		Yes
Brockton	1	1	1		Yes
Cambridge	3	3	2		Yes
Greenfield	$\frac{1}{2}$	$\frac{1}{2}$	1		Yes
Haverhill	1	1	1		Yes
Lawrence	Within city limits		2-3		Yes
Lowell	2	2	2		Yes
Lynn	2	2	$\frac{1}{2}$		Yes
Marlboro	2	2	3		Yes
New Bedford	3	3	3		Yes
Newton	1	1	1-5		Yes
No. Adams	1	1	1		Yes
Northampton	3	3	3		Yes
Norwood	2	2	2		Yes
Peabody	5-20	1	1		Yes
Revere	1	1	2		Yes
Waltham	1	2	2		Yes
Webster	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Westfield	$\frac{1}{2}$	2	4		Yes
Woburn	1	1	2		Yes
Worcester	Distances vary				Yes
Michigan:					
Adrian	2	8	30		Yes
Alpena	$\frac{1}{2}$	1	2		Yes
Ann Arbor	1-3	1-3	None used		Yes
Battle Creek	1	1			Yes
Bay City	2	2	2		Yes
Cadillac	$\frac{1}{4}$	$\frac{1}{4}$	100		Yes
Detroit	6	6	18		Yes
Dowagiac	2	2			Yes
Flint	5	5	70		No
Grand Haven	$\frac{1}{2}$	$\frac{1}{2}$	None		Yes
Grand Rapids	Available within city				
Holland	30	30	300		No
Houghton	2	1	1		Yes
Kalamazoo	2	2	None		Yes
Lansing	2	6	in city		Yes
Marquette	1	1	1		Yes
Port Huron	1	1	70		Yes, except for stone
Saginaw	3	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Sturgis	1	1	None		Yes
Three Rivers	$\frac{1}{2}$	2			Yes
Minnesota:					
Austin	$\frac{1}{2}$	$\frac{1}{2}$	65		for sand & gravel
Brainerd	2	2	6		Yes
Faribault	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Hebbling	$\frac{1}{2}$	3	4		Yes
Mankato	1-1 $\frac{1}{2}$	1-1 $\frac{1}{2}$	1		Yes
Minneapolis	Within city limits				Yes
Northfield	1	1	None		Yes
St. Cloud	1	1	1		Yes
St. Paul	2	2	2		Yes
Stillwater	$\frac{1}{2}$	$\frac{1}{2}$	in city		Yes
Virginia	2	2	2		Yes

ROAD MATERIALS LOCALLY AVAILABLE.

City and State.	Sand	Gravel	Crushed Stone	Distance in miles to nearest adequate source (excluding railroad haul) for	Are Roads Suitable for Motor Truck Transportation?
Mississippi:					
Clarksdale	All comes by rail				
Columbus	1	1			Yes
Greenwood	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$		Yes
Jackson	3	None available			
Vicksburg	1	1	None		Yes
Missouri:					
Bethany	1	1	1		No
Boonville	1	1	1		Yes
Brookfield	Only by railroad for 100 miles				
Cape Girardeau	1	3	$\frac{1}{2}$		Yes
Carrollton	1	None available			Yes
Carthage	1	1	2		Yes
Excelsior Springs	1		1		Yes
Independence	None		1		Yes
Joplin	$\frac{1}{2}$	1	1		Yes
Kansas City	All available in city				Yes
Kirkwood	3	3	$\frac{1}{2}$		Yes
Monett	None	1	1		Yes
Sedalia	40	1	5		for gravel & stone
St. Charles	1	None	None		possibly
Springfield	None	8	$\frac{1}{2}$		Yes
Webb City	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Montana:					
Anaconda	20	9	6		for sand & stone
Billings	$\frac{1}{2}$	$\frac{1}{2}$	None		Yes
Bozeman	All by railroad				
Great Falls	1	2			Yes
Helena	70	2	2		for gravel & stone
Miles City	1	1			Yes
Nebraska:					
Grand Island	$\frac{1}{2}$	$\frac{1}{2}$	None		Yes
Hastings	30	30	100		depends on weather usually
Lincoln	3	3	45		Yes
Omaha	20	20	20		Yes
Red Cloud	2	2	100		Yes
New Hampshire:					
Franklin	1	1	in city		Yes
Laconia	1-2	None	$\frac{1}{2}$ -1		Yes
Nashua	1	1	1		Yes
New Mexico:					
Roswell	5	3	None		Yes
New Jersey:					
Bayonne	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		some
Boonton	3	3	17		Yes
Camden	15	20	30		Yes
Elizabeth	30	30	6		Yes
Garfield			4		Yes
Irvington	15	20	4		Yes
Madison	$\frac{1}{2}$	$\frac{1}{2}$	7		Yes
Millville	5	5	40		No
Montclair			2		Yes
Newark	4	4	4		Yes
New Brunswick	2	None	6		Yes
Newton	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
No. Plainfield	3-4	3-4	2-3		Yes
Nutley	1	1	1		Yes
Orange	15	None	2		Yes
Plainfield	None locally				Yes
Red Bank	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Ridgewood	1	1	6		Yes
Rutherford	$\frac{1}{2}$	$\frac{1}{2}$	5-8		Yes
Westfield	None locally		2		Yes
West Hoboken	2	2	3		Yes
West Orange	Near	Near	Near		Yes
West New York	1	1	$\frac{1}{2}$ -2		Yes
New York:					
Albany	$\frac{1}{2}$	$\frac{1}{2}$	2		Yes
Amsterdam	4				Yes
Auburn	$\frac{1}{2}$		$\frac{1}{2}$ -3		Yes
Binghamton	$\frac{1}{2}$ -1	$\frac{1}{2}$ -1	60		Yes
Buffalo	From Lake & River		in city		
Corning	3	3			Yes
Cortland	4	4	4		Yes
Elmira	1	1	1		Yes
Fulton	1	1	1		Yes
Geneva	6	6	6		Yes
Glens Falls	1	1	1		Yes
Gloversville	$\frac{1}{2}$	$\frac{1}{2}$	8		for stone
Haverstraw	1	1	5		Yes
Herkimer	1	1	8		Yes
Hudson Falls	1	None	1		Yes
Jamestown	Sand & Gravel in city limits				
Lackawana	4	4	1		Yes
Lancaster	1	1	11		Yes
Little Falls	2		1		Yes
Mamaroneck	2	2	2		Yes
New York (continued):					
Bronx Borough	2				Yes
Queens Borough	1	1	1-2		Yes
Niagara Falls	2	2	3		Yes
No. Tonawanda	1	1			Yes
Ogdensburg	$\frac{1}{2}$		1		Yes
Olean	4	4			Yes
Oneida	3	3	12		Yes
Oneonta	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		Yes
Oswego	8	8	8		Yes
Rensselaer	1	1	10		Yes
Schenectady	1	2			Yes
Syracuse	5	5	4		Yes
Utica	No good local mat'ls				
White Plains	$\frac{1}{2}$	None	None		Yes
North Carolina:					
Asheville	3		$\frac{1}{2}$		Yes
Goldsboro	$\frac{1}{2}$	None	None		in good weather

ROAD MATERIALS LOCALLY AVAILABLE.

City and State.	Sand	Gravel	Crushed Stone	Distance in miles to nearest adequate source (excluding railroad haul) for	Are Roads Suitable for Motor Truck Transportation?
Greensboro	4	1	1	Yes	Yes
New Bern	1	None	None	Yes	Yes
Salisbury	2	5	5	Yes	Yes
Winston-Salem	2	None	2	Yes	Yes
North Dakota:					
Bismarck	50	50	250	Yes	Yes
Devil's Lake	3	6	...	Yes	Yes
Fargo	26	26	150	in dry weather	Yes
Wahpeton	1	20	200	No	No
Ohio:					
Ashtabula	1-3	1-3	...	Yes	Yes
Barberton	1	1	100	Yes	Yes
Bellevue .....	...	...	1	Yes	Yes
Bucyrus .....	...	...	6	Yes	Yes
Cincinnati	In city limits	...	15	Yes	Yes
Circleville	1	1	30	Yes	Yes
Coshocton	1	1	...	Yes	Yes
Defiance	Near	None	...	Yes	Yes
Delaware	None available	...	1 1/2	Yes	Yes
E. Liverpool	Local	...	...	Yes	Yes
Findlay	None locally	...	In city	Yes	Yes
Fostoria	60	...	8	Yes	Yes
Fremont	1 1/2	...	1	Yes	Yes
Greenville	1 1/2	1 1/2	1 1/2	Yes	Yes
Hamilton	1 1/2	1 1/2	...	Yes	Yes
Ironton	Sand and gravel shipped in; slag 2 miles	...	...	Partly	Yes
Lakewood	15	15	...	Yes	Yes
Lancaster	1 1/2	1 1/2	...	Yes	Yes
Lima	1 1/2	1 1/2	1 1/2	Yes	Yes
Logan	1	1	2	Yes	Yes
London	none available locally	...	...	Yes	Yes
Lorain	Sand 30 miles by boat	...	...	Yes	Yes
Marietta	Sand and gravel in city	...	...	Yes	Yes
Marion	3	3	3	Yes	Yes
Middletown	Gravel 1 mile; stone and sand by rail	...	...	Yes	Yes
Newark	1	1	40	Yes	Yes
Norwood	No local materials available	...	...	Yes	Yes
Painesville	1	1	By rail	Yes	Yes
Piqua	2	2	1	Yes	Yes
Port Clinton	By electric railway	...	...	Yes	Yes
St. Bernard	1	1	By rail	Yes	Yes
Sandusky	All locally available	...	...	Yes	Yes
Springfield	2	2	5	Yes	Yes
Steubenville	1	1	None	Yes	Yes
Troy	1	1	8-30	Yes	Yes
Urbana	3/4	3/4	1 1/2	Yes	Yes
Van Wert	60	60	8	Yes	Yes
Wapakoneta	1	1	...	Yes	Yes
Washington	1 1/2	1 1/2	...	Yes	Yes
Westerville	12	12	12	Yes	Yes
Xenia	2	2	9	Yes	Yes
Youngstown	2	2	2	Yes	Yes
Zanesville	1 1/2	1 1/2	By rail	Yes	Yes
Oklahoma:					
Bartlesville	1	...	1-4	Yes	Yes
Elk City	2	2	...	Yes	Yes
Enid	3	None	125	Yes	Yes
Hartshorne	Shipped in	...	1	Yes	Yes
Kingfisher	2	None available	...	Yes	Yes
McAlester	6	6	20	Yes	Yes
Wagoner	15	15	...	Yes	Yes
Oregon:					
Ashland	1 1/2	1 1/2	1 1/2	Yes	Yes
Corvallis	3/4	3/4	3/4	Yes	Yes
Eugene	1	In city	...	Yes	Yes
Marshfield	22	50	5	No	No
Newburg .....	...	1	...	Yes	Yes
North Bend	10	24	10	In summer	Yes
Roseburg	2 1/2	2 1/2	2 1/2	Yes	Yes
Salem	1 1/2-2	1 1/2-2	1 1/2-2	Yes	Yes
West Linn	1	1	...	Yes	Yes
Pennsylvania:					
Beaver Falls	18	18	...	Fair	Fair
Bloomsburg	1 1/2	1 1/2	3	Yes	Yes
Bradford	2	15	2-6	Yes	Yes
Carlisle	1	1	1	Yes	Yes
Charleroi	1	By rail	...	Yes	Yes
Coatesville	near	...	3	Yes	Yes
Columbia .....	...	1 1/2	1 1/2	Yes	Yes
Duquesne	6 1/2	6	1	Yes	Yes
Easton .....	...	1	...	Yes	Yes
Franklin	1/2	1/2	1/2	Yes	Yes
Freeland	1/2	1/2	None	Yes	Yes
Greenville	20	...	2	Yes	Yes
Hanover	3/4	3/4	1	Yes	Yes
Hazleton	3	...	3	Yes	Yes
Holidaysburg	20	...	Near	Yes	Yes
Lansford	1	None	1	Yes	Yes
Lebanon	1	...	2	Yes	Yes
Lewisburg	1 1/2	1 1/2	1	Yes	Yes
McKeesport	2	2	None	Yes	Yes
Meadville	1 1/2	...	3	Yes	Yes
Norristown	1	1	1	Yes	Yes
North Braddock	34	34	...	Fair	Fair
Oil City	1	1	1	Yes	Yes
Old Forge	20	20	10	Yes	Yes
Olyphant	25	...	...	...	...
Punxsutawney	1 1/2-4	1 1/2-4	...	Yes	Yes
Pittsburgh	1	1	3	Yes	Yes
Pittston	1	1	None	Yes	Yes
Rankin	2	None	1	Yes	Yes
Reading	2 1/2	2 1/2	60	No	No
Royersford	None	12	2	Yes	Yes
Sayre .....	...	...	...	Part of time	Part of time
Scranton	20-30	Yes	In city	Yes	Yes
St. Marys .....	...	...	...	...	...
Shamokin .....	...	...	...	...	...

ROAD MATERIALS LOCALLY AVAILABLE.

City and State.	Sand	Gravel	Crushed Stone	Distance in miles to nearest adequate source (excluding railroad haul) for	Are Roads Suitable for Motor Truck Transportation?
Tyrone	3	3	2	City quarry	Yes
Waynesboro	10	...	...	...	Yes
West Berwick	1/10	1/10	...	...	Yes
Wilkes-Barre	1	12	9	...	No
Wilkesburg	4	4	37	...	Yes
Williamsport	1	1	2	...	Yes
Rhode Island:					
Pawtucket	1-2	...	1-2	...	Yes
Providence	2	5	3	...	Yes
Woonsocket	1	1	1	...	Yes
South Carolina:					
Columbia	2	3	2	...	Yes
Greenville	2	...	2	...	Yes
Orangeburg	1	...	1	...	Yes
South Dakota:					
Lead	1	1	2	...	Yes
Madison	1 1/2	1 1/2	By rail	...	Yes
Mitchell	1	1	1	...	Yes
Sioux Falls	2	...	1	...	Yes
Yankton	1 1/2	1 1/2	1 1/2	...	Yes
Tennessee:					
Clarksville	1 1/2	1 1/2	1	...	Yes
Dyersburg .....	...	None locally available	...	...	Yes
Greenville	8	...	In city	...	Yes
Jackson	1 1/2	1 1/2	...	...	Yes
Lebanon	6	6	30	...	Except stone
Memphis	In river	...	50	...	Yes
Murfreesboro:					
Murfreesboro	1/2	1/2	1/2	...	Yes
Texas:					
Austin	2	2	None used	...	Partly
Brownwood	2 1/2	2	2	...	Yes
Clarksville	185	185	100	...	Yes
Cleburne	18	18	None	...	Yes
Corpus Christi	80	80	170	...	No
Greenville	40	40	80	...	No
Longview	25	25	...	...	No
Paris	46	46	None locally available	...	Yes
Port Arthur	4	4	None	...	No
San Angelo	All in city	1	...	...	Yes
Temple	1	1	1	...	Yes
Waxahachie	1	1	1	...	Yes
Utah:					
Logan	2	2	2	...	Yes
Ogden	1	1	1	...	Yes
Salt Lake City	3	3	3	...	Yes
Tooele City	1/2	1/2	...	...	Yes
Vermont:					
Burlington	In city limits	...	...	...	Yes
Montpelier	1 1/2	1 1/2	1	...	Yes
St. Albans	2	2	1	...	Yes
St. Johnsbury	1/2-3/4	1/2-3/4	3/4-1 1/4	...	No
Virginia:					
Charlottesville	1 1/2	...	...	...	Yes
Danville	1 1/2	None	...	...	Yes
Harrisonburg	20	...	1	...	Yes
Martinsville	4	4	60	...	Yes
Newport News	Available by rail or water	...	...	...	Yes
Pulaski	2	0.6	0.6	...	Yes
Suffolk	1 1/2	...	...	...	...
Winchester	1/4	1/4	3/4	...	...
Washington:					
Aberdeen	1	1	...	...	No
Bellingham	1	1	...	...	Yes
Everett	Water transportation available	...	...	...	Yes
Olympia	1/2	1/2	1/2	...	Yes
Seattle	1-5	1-5	...	...	Yes
Spokane	2	2	1	...	Yes
Tacoma	In city	...	20	...	Yes
Walla Walla	In city	...	...	...	...
Yakima	2	2	3	...	Partly
West Virginia:					
Bluefield	Only by rail	1 to 2	...	...	Yes
Fairmont	1 1/4	By rail	1/2	...	Yes
Huntingdon	15	40	None used	...	Yes
Mannington	1 1/2	1 1/2	By rail	...	Yes
Moundsville	1/2-1	None	5	...	Yes
Piedmont	1/4	Nearby	At street	...	Yes
Williamson .....	...	...	...	...	...
Wisconsin:					
Baraboo	1 1/2	...	...	...	Yes
Beloit	1	1	...	...	Not good
Eau Claire	1/2	...	...	...	No
Edgerton	2	2	...	...	Yes
Fond du Lac	50	50	15	...	Yes
Fort Atkinson	1 1/2	1 1/2	...	...	Yes
Grand Rapids	1	1	60	...	Yes
Green Bay	2	...	8	...	Yes
Janesville	3/4	3/4	3/4	...	Yes
Kenosha	3	Must be shipped in	...	...	Yes
Lake Geneva	1/3	1/3	1/3	...	Yes
Madison	50	50	80	...	No
Manitowoc	2	2	...	...	Yes
Marinette	1	None locally	...	...	...
Menasha	2	2	1	...	Yes
Milwaukee	1-3	1-3	1-3	...	Yes
New London	20	1-20	20	...	Fair
Oshkosh	Shipped by boat 8 mi.	In city	...	...	Yes
Plymouth	All in city limits	...	...	...	...
Port Washington	1	1	1	...	Yes
Two Rivers	2	2	9	...	Yes
Wauwatosa	All in city limits	...	...	...	Yes
Waukesha	2	2	2	...	Yes
Waupaca	4	4	Local	...	Yes
Wausau	1 1/2	1 1/2	1	...	Yes
West Allis	1 1/2	1 1/2	2	...	Yes
Whitewater	20	20	20	...	Yes
Wyoming:					
Cheyenne	1/4	1/4	None	...	Yes

CONCRETE PAVEMENTS LAID IN 1917.

State and City.	Yards laid in 1917.	Av. cost per yard.	One or two-course.	Thick-ness.	Proportions of mix.	Is reinforcement used?	Do you use hydrated lime?	How far apart are expansion joints?
Alabama:								
Gadsden	4,000*	1.55	two	..	1:2½:5	No	No	30
Montgomery .....	..	..	one	6	1:2:3	No	No	30
Tuscaloosa .....	..	..	..	..	..	No	No	30
Arkansas:								
Fort Smith	1,200*	1.38	..	..	1:2:3	No	No	40
Little Rock	39,500*	1.50	..	6	1:2:4	..	..	..
California:								
Alameda .....	..	..	..	..	..	No	No	30
Bakersfield	11,383*	1.33†	one	4	1:2½:4½	No	No	50
Berkeley	8,000*	1.12½	..	6	1:2½:4½	No	No	20
Los Angeles	53,704*	1.11-1.18	..	5-6	1:2:3½	No	No	50
Oakland	2.0*	1.00	one	4-5	1:2:4	No	No	None
Pasadena	25,505*	.864†	one	5	1:2½:5	No	No	Not used
Petaluma	10,000*	.67	one	..	1:2:4	No	No	Not used
Pomona .....	..	..	one	4	1:2:4	No	No	32
Redlands .....	..	..	..	..	1:2:4	On swampy lands	No	40
Richmond .....	..	..	one	6	1:2½:5	No	No	..
San Bernardino	34,497*	.774	..	..	1:2½:5	No	Will in future	None
Santa Ana .....	..	..	one	4	1:3:6	..	..	..
Santa Barbara	3,535*	1.60†	one	4-5	1:2:3½	No	No	25-30
Santa Monica .....	..	..	one	4	1:2:4	Some	No	50
Stockton	4,439	..	..	..	..	..	..	..
Colorado:								
Colorado Springs	2,000*	1.50†	one	6	1:2:4	No	No	50
Fort Collins	17,124†	1.32†	one	6	1:2:3	Yes	No	35-40
Connecticut:								
Ansonia .....	..	..	..	..	..	No	No	30
Bristol .....	..	..	both	8	1:2:3½	Yes	..	20-25
Greenwich	23,350*	1.56	one	5-7	1:2:4	Yes	No	50
Hartford	10,190*	1.49	one	7	1:2:4	Some	No	40
Middletown	8,882*	2.02†	one	6-8½	1:2:4	Yes	No	30
New Haven	4,182*	..	one	Hassam	1:2:2½	No	No	None
Stamford	2,123*	1.51	one	6	1:2:4	Some	No	20-35
Wallingford .....	..	..	..	..	..	Some	No	30
Delaware:								
New Castle .....	..	..	..	..	..	No	No	50
District of Columbia:								
Washington	26,532	0.89	one	..	1:2:4	No	No	End of day's work
Florida:								
Pensacola .....	..	..	one	6	1:2½:5	No	No	20
Georgia:								
Americus	12,862†	1.13	one	6	1:2:3	Yes	No	36
Athens	11,500†	1.30	two	7	{ 1:3:5 }	..	..	40
Savannah	24,427	1.44†	one	6	{ 1:2 }	No	..	30
Idaho:								
Lewiston	6,576†	1.45	one	6	1:2:3	No	No	30
Boise .....	..	..	..	..	..	No	No	30-50-75
Moscow .....	..	..	..	..	..	No	No	25-40
Pocatello .....	..	..	..	..	..	No	No	30
Twin Falls .....	..	..	one	6	1:2:3	No	No	30
Illinois:								
Alton .....	..	..	two	8½	{ 1:2½:4 }	Yes	No	30
Canton	1,344†	1.25	one	..	{ 1:1:1½ }	No	No	50
Champaign .....	..	..	..	..	1:2½:3	Yes	No	30
Chicago	295,299*	1.97	one	7	1:2:3	No	No	35
Chicago Heights .....	..	..	..	..	..	No	No	50-100
Decatur .....	..	..	..	..	..	Yes	No	33
De Kalb .....	..	..	..	..	..	Yes	No	36
Dixon	9,865*	1.285	one	5	{ 1:2:3 }	No	No	20-25
E. St. Louis	11,887*	1.79†	two	4-7½	{ 1:2½:4 }	Yes	No	30
Evanston .....	..	..	..	..	{ 1:1:1½ }	No	Yes	33
Freeport .....	..	..	..	..	..	No	No	50-100
Gibson City .....	..	..	..	..	..	No	No	33
Granite .....	..	..	..	..	..	Yes	..	3
Highwood	7,774*	1.54	one	..	1:2:3	Yes	No	33
Marion	12,650*	1.59	one	8	1:2:3	No	No	35
Moline	570*	1.43	..	..	1:2:3	Yes, if more than 20' wide	No	20-30
Oak Park	7,390*	1.76	one	6	1:2:3	No	No	33
Peoria	15,000*	1.40	one	6	1:2:3	Yes	No	40
Pontiac	3,069	1.71	one	7½	1:2:3	Yes	No	36
Springfield .....	..	..	..	..	..	No	No	40
Taylorville .....	..	..	..	..	..	Yes	No	24
Waukegan	25,100*	1.82	two	7	{ 1:2½:4 }	Yes	No	30
Indiana:								
Anderson	14,000*	2.00	one	6-8	1:2:3	Yes	No	25
E. Chicago	51,504	2.82†	both	7-8	1:2:3	Yes	No	30
Fort Wayne	4,100*	1.67	two	7	{ 1:2:4 }	Yes	No	..
Frankfort .....	..	..	..	..	{ 1:1 }	..	..	..
Gary	42,900*	2.00**	one	7	1:2:3	Yes	No	25
Hartford City .....	..	..	..	..	..	No	No	30
Indianapolis	¾*	2.20	two	8	{ 1:2½:4 }	No	No	50
Kendallville .....	..	..	two	6-8	{ 1:2 }	Yes	..	35
New Albany	14,909	..	one	7-8	{ 1:2½:4 }	Yes	No	40
Noblesville	32,267	1.20	one	6-8	{ 1:1½ }	Yes	No	33½
Peru .....	..	..	..	..	1:2:4	Yes	No	25-30
Portland .....	..	..	..	..	1:2:4	Yes	Yes	35
Richmond	530*	1.16†	one	6	1:2:3	Yes	No	25
Seymour	36,000*	1.50	one	6-8	1:2:3	Yes	No	30-35
South Bend	4,489	1.41	one	7	1:2:3	Yes	No	36
Terre Haute .....	..	..	one	..	1:6	No	No	25
Iowa:								
Algona	1,050	1.54†	one	6	1:2:4	Yes	No	100
Atlantic .....	..	..	..	..	..	No	No	25
Burlington	102,699*	1.47†-2.86§	one and two	5+2=7	1:2:3	No	No	30
Cedar Falls	484*	1.45†	one	6	..	No	No	25
Cedar Rapids	3,000	1.34	two	5+2	{ 1:3:5 }	No	No	32

CONCRETE PAVEMENTS LAID IN 1917 (Continued).

State and City.	Yards laid in 1917.	Av. cost per yard.	One or two-course.	Thick-ness.	Proportions of mix.	Is reinforcement used?	Do you use hydrated lime?	How far apart are expansion joints?
Iowa (continued).								
Creston .....	...	...	...	...	...	Partly	No	25
Davenport	10,568*	1.40	one	6	1:2:4	No	No	20
Denison	9,000*	1.475	one	7	1:2:3	No	No	35
Dubuque .....	...	...	...	...	...	Some	No	20-25
Fairfield .....	...	...	...	...	...	No	No	10
Fayette .....	...	...	...	...	...	No	No	25
Ft. Dodge .....	...	...	...	...	...	No	No	30-50
Glenwood	2,700*	1.81†	one	...	1:2:4	Over ditches	No	35
Iowa City	3,334*	1.37-1.77	one	7	1:2:4	Not yet	Not yet	30
Marshalltown	5,92*	1.57	one	6	1:2:3	No	No	25
Mason City	4,000*	1.63	two	6	{ 1:2½:4 }	Yes	..	..
Monticello .....	...	...	...	...	{ 1:1½:½ }	No	..	20
New Hampton .....	...	...	two	2+5	{ 1:2:4 }	No	..	33
Perry .....	...	...	...	...	{ 1:2 }	Yes	No	25
Sioux City	85,000*	{ 1.80 }	one	{ 8 }	1:2½:4½	No	No	50
...	...	{ 1.45 }	...	{ 6 }	...	...	...	...
Kansas:								
Arkansas City	630*	1.10††	one	6-7	1:2:4	No	No	40
Atchison	3,500*	1.42	two	6	{ 1:2:3 }	No	No	30
...	...	...	...	...	{ 1:2½:5 }	...	...	...
Columbus	580	1.20	one	6	1:2:4	No	No	25
Council Grove	1,600*	1.91	one	8	1:2:3	Yes	No	30
Emporia .....	.17*	1.54	one	6	1:1½-3	Yes	No	30
Girard .....	...	...	...	...	...	No	No	30
Gypsum	18,568*	1.58†	one	6½	1:6	No	No	30
Independence	2,000*	1.25	two	4+2=6	{ 1:2:4 }	No	No	30
...	...	...	...	...	{ 1:2:3 }	...	...	...
Iola .....	...	...	...	...	...	No	No	30
Kansas City	58,884	1.275	one	6	...	No	No	50
Leavenworth .....	...	...	...	...	...	Yes	No	20
Manhattan	668*	1.35	one	6-8	1:2:3	..	Yes	30
Ottawa	1,733*	1.48	one	6	1:2:3	No	No	50
Parsons .....	...	...	...	...	...	No	No	30
Pittsburg .....	...	...	...	...	...	No	Yes	30
Rosedale	13,460*	1.10	one	6	1:2:4	No	No	25-28
Salina .....	.20*	1.53	one	6	1:2:3	No	No	25
Kentucky:								
Louisville	1,917*	1.30	one	5-7	1:1½:3	Over 18 ft.	No	30
Ludlow .....	...	...	...	...	...	Yes	No	30
Louisiana:								
Lake Charles	24,000*	1.80	6-inch	Vibrolithic	1:2:4	Some	No	30
Shreveport .....	...	...	one	5	1:3:5	No	No	50
Maine:								
Augusta	2,600*	1.65††	Hassam	..	...	No	No	..
Portland	6,326*	1.97	6-in. Hassam	..	...	No	No	..
So. Portland	7,800†	1.53	one	6	1:2:4	No	No	25
Maryland:								
Cumberland	19,547*	..	one	6	1:2:4	No	No	30
Frederick .....	...	..	...	...	...	No	No	50
Massachusetts:								
Adams	3,000*	...	two	7	1:2:4	Yes	No	35
Arlington	2,240	2.45	one	8	1:2:4	Yes	No	50
Brockton	8,276*	2.60††	...	...	6-in. Hassam	No	No	..
Lowell .....	...	...	...	...	...	No	No	..
Lynn	24,976†	1.75	one	6	1:2:4	No	No	..
New Bedford	450†	..	one	8	1:3:5	..	No	30
North Adams .....	...	...	...	...	...	No	No	36
Northampton	{ 7,260*	{ 1.25† }	one	6	1:2:4	No	No	30
...	{ 3,540†	{ 1.10† }	...	...	...	...	...	...
Norwood	1,600*	2.00†	one	6	...	No	No	End day's work
Peabody	16,500*	2.17†	...	...	6-in. Hassam	No	No	...
Westfield	500†	...	one	5-7	1:2:3	No	No	25
Worcester	265†	1.60	one	6	1:2½:4½	No	No	None used
Michigan:								
Adrian .....	...	...	...	...	...	No	No	30
Alpena	6,851†	1.92††	two	8	...	Some	..	25-40
Ann Arbor .....	...	...	...	...	...	...	...	30
Bay City .....	...	...	...	...	...	No	No	30
Cadillac	1,475†	.84	one	7	1:4††	No	No	End day's wk.
Detroit	161,556*	1.90	one	6	1:2:3	No	No	30
Dowagiac .....	...	...	...	...	...	No	No	30
Grand Haven	20,000†	1.20††	...	6	...	No	No	30
Grand Rapids	2,284*	1.38	one	7	1:4	Yes	No	50
Holland .....	...	...	...	...	...	No	No	50
Lansing .....	...	...	...	...	...	No	No	30
Port Huron	1,200†	1.60†	two	6-8	1:2:3½	On clay	Yes	20
Sturgis	2,000*	1.60	one	5-7	1:4	No	No	20
Three Rivers .....	...	...	...	...	...	No	No	30
Minnesota:								
Brainerd	28,609*	1.687	one	6	1:3††	No	No	30
Mankato	730*	1.35†	one	6	1:2:3½	Yes	No	30
Minneapolis	16,700†	...	one	7	1:2:4	No	No	..
St. Paul	4,400	1:75†	one	7	1:2:4	No	No	25
Stillwater .....	...	...	...	...	...	Yes	No	25-35
Mississippi:								
Jackson .....	...	...	...	...	...	No	No	30-50
Vicksburg .....	...	...	one	4	1:3:5	No	No	100
Missouri:								
Bethany	7,550*	1.44†	one	6	1:2:4	No	No	25
Boonville .....	...	...	...	...	...	No	No	25
Brookfield .....	...	...	...	...	...	No	No	30
Cape Girardeau	21,101*	1.14	one	6	1:1½:3	Yes	No	50
Carthage	68,766*	1.295	one	6	...	Yes	No	40
Excelsior Springs .....	...	...	...	...	...	No	No	30-40
Independence .....	...	...	...	...	...	No	No	25-30
Joplin	59,060*	1.40†	two	..	{ 1:4½ }	Yes	No	20-50
...	...	...	...	...	{ 1:1½ }	...	...	...

CONCRETE PAVEMENTS LAID IN 1917 (Continued).

State and City.	Yards laid in 1917.	Av. cost per yard.	One or two-course.	Thick-ness.	Proportions of mix.	Is ment used? reinforce-	Do you use lime? hydrated	How far apart sion joints? are expan-
Kansas City	326,160	1.40	one	7	1:2:3½	No	No	None
Sedalia	19,200*	1.45†	one	6	1:2:3	No	No	36
Springfield .....	....	..	...	..	....	More than 27' wide	No	33
Webb City .....	....	..	one	7	1:1:4	No	No	25
Montana:								
Billings	3,027*	1.84	one	6	1:2:4	Yes	No	25
Bozeman	1,200*	2.80	one	6	1:1½:3	No	No	25
Great Falls	8,550*	1.42	one	6	1:2:4	No	No	35
Helena	27,300*	1.70	one	6-8	1:1½:3	Yes	..	33
Nebraska:								
Hastings	1,000	1.85	two	6	{ 1:4½:1 } { 1:3 top }	No	No	25
Lincoln	2,338*	1.47†	one	6	1:2½:4	No	No	40
Omaha	19,568*	1.43	one	6	1:2:4	No	No	30
New Hampshire:								
Nashua	1,000†	1.25	one	..	1:1½:3	No	No	50
New Jersey:								
Camden	936	..	one	6	1:2½:5	..	..	..
Irvington	14,215	1.75	..	6	1:2:3	Some	No	33½
Millville .....	..	..	one	7	1:2:3	Yes	No	..
Montclair	3,950*	1.52	one	7	1:2:3	Yes	No	30
New Brunswick	6,600*	1.95†	one	7	1:2:3	No	No	36
Newton	5,700*	..	one	..	1:2:3	Yes	No	36
Plainfield	29,009*	1.85†	one	6-8	1:1½:3	Yes	..	50
Rahway	4,311†	1.06	one	6	1:1½:3	Yes	..	..
Red Bank	3,237†	2.50	one	6-8	1:1½:3	Yes	No	25-30
Ridgewood	4,000*	2.16	one	7½	1:2:4	Yes	No	30
Westfield .....	..	..	one	6-8	1:1½:3	Yes	No	50
New York:								
Amsterdam	3,000*	2.00†	one	7	1:2:3	Yes	No	33
Binghamton	9,000*	1.66†	one	7	1:2:3	Yes	No	36
Buffalo .....	..	..	..	..	..	No	No	50
Corning .....	..	..	..	..	..	Yes	No	25
Fulton .....	..	..	one	6	1:1½:3	Yes	No	30
Geneva .....	..	..	..	..	..	Yes	No	30
Glens Falls .....	..	..	..	..	..	Yes	No	30
Gloversville .....	..	..	..	..	..	Yes	No	35
Haverstraw .....	..	..	..	..	..	No	No	30-200
Herkimer .....	..	..	..	..	..	Yes	..	30
Lancaster .....	..	..	..	..	1:1½:3	..	..	..
Little Falls	2,708*	2.76††	one	5-7½	1:1½:3	No	No	30
Mamaroneck .....	..	1.60	..	..	..	No	No	25
New York:								
Manhattan Borough	9,902*	2.42	two	9-5	1:2:3	Yes	No	50
Richmond Borough	12,458*	1.53	one	6	1:2:4	No	No	35
Niagara Falls	3,390*	2.76††	one	8	1:2:3	No	No	30
North Tonawanda .....	..	..	..	..	..	Yes	No	30
Oneida	3,210*	1.73†	one	6	1:2:4	No	No	33
Schenectady	980*	1.10†	one	6	1:2:3	No	No	30
White Plains	3,109*	2.42†	one	6-9	1:2:3	No	No	30
North Carolina:								
Asheville	{ 18,296* 17,696† }	{ 1.30† 1.15† }	one	6-7	1:2:4	No	No	25-30
Greensboro	7,675†	1.07†	one	6	1:2:4	No	No	50
New Bern .....	..	..	..	..	..	No	No	50
Salisbury	12,000*	1.39	one	6	1:2:3	No	Some	30
Winston-Salem .....	..	..	..	..	1:2:3	Yes	No	33½
North Dakota:								
Bismarck .....	..	..	two	2+5	..	Yes	No	35
Fargo .....	..	..	..	..	..	Yes	No	30
Grand Forks	10,480	1.59	one	6-8	1:2:3	Yes	..	..
Ohio:								
Bellefontaine	4,260*	1.38	one	..	1:2:3	Yes	No	50
Cincinnati	4,057*	2.07	one	7	1:1½:3	Most streets	No	30
Cleveland	1,05*	2.25	two	6-8	{ 1:1½:3 1:2½:5 }	Yes	..	100
Delaware .....	..	..	..	..	..	Yes	No	100
East Liverpool	7,157*	1.70†	one	6	1:1½:3	More than 20' wide	No	36
Findlay .....	..	..	..	..	..	No	No	30
Fostoria	5,945	1.52	one	6	1:2:3	Yes	No	60-100
Greenville .....	..	..	..	..	1:1½:3	Yes	No	33½
Hamilton .....	..	..	..	..	..	Yes	No	30
Ironton .....	..	..	..	..	..	Yes	No	30
Lakewood	10,170*	2.80	two	7	{ 1:2½:4 1:1½:2 }	Yes	No	36-50
Marietta	5,851*	1.42†	one	6	1:2:4	No	No	25
Marion .....	..	..	..	..	..	Yes	Yes	100
Middletown	6,278*	1.98†	..	..	1:2:3	Yes	No	60
Painesville	2,098	1.89††	two	5-7	{ 1:2½:5 1:1½:3 }	Yes	No	30
Port Clinton	583*	1.70	one	6-8	1:1½:3	Yes	No	40
St. Bernard	300	1.00	one	6	1:2½:5	No	Will	30
Sandusky	15,900*	1.34-1.90	two	5-8	..	Yes	No	50
Toledo	4,942*	2.27	one	6-8	1:2:3	Yes	No	36
Urbana .....	..	..	..	..	..	No	No	25
Van Wert .....	..	..	..	..	..	Yes	No	30
Wapakoneta .....	..	..	..	..	..	..	..	30-60
Youngstown .....	..	..	..	..	..	Yes	No	30
Zanesville	4,680*	2.10	one	6-8	1:1½:3	Yes	No	30
Oklahoma:								
Bartlesville	18,400*	1.28	one	6-8	..	No	..	30
McAlester	1,617*	1.50	one	6	1:1½:3½	No	No	35
Wagoner .....	..	..	..	..	..	Yes	..	50
Oregon:								
Corvallis .....	..	..	one	6	1:4½	Yes	No	30
Newberg	972*	1.62	one	5½-6½	1:1½:3	No	No	30
North Bend	14,300*	1.28	one	6	1:2:3	On poor base	No	36
Salem	6,223†	1.10	one	6	1:2:4	No	No	50
West Linn	4,000*	1.39	one	6	1:2:4	No	No	24
Pennsylvania:								
Beaver Falls .....	..	..	..	..	..	No	No	32
Carlisle	232†	1.94†	..	..	1:3:4	Yes	No	40
Franklin	275†	1.98††	one	6	1:2:2½	No	No	25
Freeland	1.0*	1.90	two	8	1:3:5	Yes	No	10-.6

CONCRETE PAVEMENTS LAID IN 1917 (Continued).

State and City.	Yards laid in 1917.	Av. cost per yard.	One or two-course.	Thick-ness.	Proportions of mix.	Is reinforcement used?	Do you use hydrated lime?	How far apart are expansion joints?
Hazleton	{ 3,705* 416†	1.75‡ { .70‡ }	one	5	1:2:4	..	..	....
Johnstown	2,486*	2.03‡	one	6	1:2:3	Yes	No	24
Lebanon	1,600	2.26‡	one	6	1:1½:3	Yes	No	30
McKeesport .....	..	..	one	..	1:2½:5	..	..	..
Philadelphia	1,564*	1.683	..	..	1:2:4	No	No	30
Pittsburgh	{ 9,365* 2,110*	1.90 { 1.85 }	one	6-8	1:2:3	No	No	30
Reading .....	..	..	..	..	..	No	No	25-40
Sayre	4,800*	1.72	one	6	1:2:3	Yes	No	30
Shamokin .....	..	..	..	..	..	No	No	40
Wilkinsburg	1,141*	3.10§§	one	7	1:2:3	No	No	15' on 15' rda.
Rhode Island:								
Woonsocket	1,900*	..	one	6	1:2:4	No	..	30
South Carolina:								
Greenwich	*3,000*	1.35‡	one	7	1:2:3	No	No	35
South Dakota:								
Lead	307*	2.93	one	6	1:2:4	Yes	No	35
Mitchell	250*	1.807	two	..	{ 1:3:5 } { 1:1:1 }	Yes	No	30
Sioux Falls	10,679*	1.75‡	one	6-7	..	No	No	35
Yankton	26,000*	1.38	one	6	1:2:3	Over 30 ft.	No	30
Tennessee:								
Clarksville .....	..	..	..	..	..	No	No	25
Dyersburg	500	1.40‡	one	6	1:2:3	No	No	36
Lebanon .....	..	..	..	..	..	No	No	30
Memphis	981*	1.38	one	6	1:5	No	No	35
Murfreesboro .....	..	..	..	..	..	No	No	25
Texas:								
Austin	1,868*	1.65‡	two	..	{ 1:6 } { 1:2 }	No	No	25
Clarksville .....	..	..	one	4	2:3:4	Yes	Yes	30
Greenville .....	..	..	..	..	..	No	Yes, 5%	33
Port Arthur .....	..	..	..	..	..	Yes	No	32
Temple	600	1.21	two	4+2=6	{ 1:6 } { 1:4 }	No	No	25
Waxahachie .....	..	..	..	..	..	..	..	30
Utah:								
Logan	21,000*	2.00	one	7	1:2:4	Yes	No	40-60
Ogden	30,852*	1.65	two	6	..	Yes	No	40-50
Salt Lake City	45,675	1.20	one	6-8	1:2:3	Some	No	30-50
Virginia:								
Charlottesville	4,633*	1.79	one	5-7	1:1½:3	No	No	50
Danville .....	..	..	..	..	..	No	No	30
Martinsville	130	1.50	two	5	{ 1:3:5 } { 1:2 }	No	No	30
Newport News	20,305	3.64	two	7-9½	{ 1:3:6 } { 1:1½:3 }	No	..	..
Suffolk	11,000†	1.30	one	..	1:1½:3	No	No	35
Washington:								
Aberdeen	{ 670* 972*	1.79 { 1.50 }	one	{ 8 } { 6 }	1:2:3	No	No	30
Bellingham	12,138*	1.34	one	6-8	1:2:3	No	No	30
Everett	29,529*	1.325	one	6	1:2:3	No	No	30
Olympia .....	..	..	one	7	1:2:3	..	..	..
Seattle	1,46*	1.60	{ one two }	5 6	1:2½:4 { 1:3:6 } { 1:1½:1 }	No	No	30
Spokane .....	..	..	..	..	..	No	..	30
Tacoma	1,383*	1.50	two	..	{ 1:3:6 } { 1:1:1 }	No	No	25
Walla Walla .....	..	..	..	..	..	No	No	30
Yakima .....	..	..	..	..	..	No	No	25
West Virginia:								
Fairmont	800†	2.00	one	5	1:2:4	Over 20' wide	No	35-40
Huntingdon .....	..	..	..	..	..	No	No	30
Moundsville .....	..	..	..	..	..	..	..	25
Piedmont	705*	1.35	one	..	1:2:4	No	No	50 or less
Wisconsin:								
Eau Claire	27,882†	1.78	one	7	1:2:3½	Yes	No	30
Edgerton	19,000*	1.59	one	5½+8½	1:2:3	Yes	No	25
Fond du Lac	{ 17,914* 1,201† }	1.69‡	two	5-8	{ 1:2½:5 } { 1:1:1 }	Yes	No	50
Ft. Atkinson	12,400*	2.00	one	7	1:2:3½	Yes	No	35
Grand Rapids	3*	1.52	two	..	1:2½-3½	Yes	No	35
Green Bay	3,300	2.10	two	6+2=8	{ 1:2½:4 } { 1:1½:2½ }	Yes	No	30
Janesville .....	..	..	..	..	..	Yes	No	33
Kenosha .....	..	..	two	5+2=7	{ 1:2:4 } { 1:1:1½ }	Will	No	40
Lake Geneva .....	..	..	..	..	..	Yes	No	35
Madison	2,56*	1.65	two	..	{ 1:2½:4 } { 1:1½:2½ }	Yes	No	30
Marinette	11,876*	1.70	two	..	{ 1:2½:5 } { 1:1:1½ }	Yes	No	42
Menasha	3,000*	1.85	two	7	1:2½:4	Yes	No	35
Milwaukee	28,233*	1.36	one	6	1:2½:4	No	No	50
New London .....	..	..	..	..	..	Yes	No	25-35
Oshkosh .....	..	..	..	..	..	Yes	Yes	50
Plymouth	½	1.70‡	two	7	..	Yes	No	25
Wausau	5,300*	1.85‡	two	5+2½=7½	{ 1:2:3 } { 1:1:2 }	Yes	Yes	30
Wauwatosa	734*	1.95**	two	7	{ 1:2½:5 } { 1:2 }	Yes	No	30
West Allis .....	..	..	one	6-8	1:2:3½	Yes	No	30-50
Whitewater	11,450*	1.52	one	7	1:2:3½	Yes	No	35

Footnotes—*By contract; †by municipality; ‡includes grading; §between car tracks; **includes curbs only; ††includes grading, curbs, engineering, walks (everything); ‡‡gravel concrete; §§includes all but grading; †††includes grading from grade to subgrade.

GRANITE AND STONE BLOCK PAVEMENTS.

City and State.	Yards Laid in 1917.	Aver. Cost per sq. yd.	Kind of Filler.	Kind. Thickness.	Base Thickness.
California:					
San Francisco.....	16,261*	\$3.22*	....	conc.	6
Connecticut:					
Greenwich.....	623*	5.00*	pitch	conc.	6
Hartford.....	3,050*	4.33*	grout	conc.	6
New Haven.....	4,674*	4.46*	gravel pitch	conc.	6
District of Columbia:					
Washington.....	12,294	2.84\$	....	conc.	6
Georgia:					
Savannah.....	1,851	2.57*	....	....	2
Illinois:					
Chicago.....	78,073*	4.99\$	pitch & gravel	conc.	6
Indiana:					
Indianapolis.....	0.10*	3.11*	sarco	conc.	6
Kentucky:					
Louisville.....	{ 4,359† 2,132*	4.06\$	grout	conc.	6
Maine:					
Augusta.....	1,886**	3.003††	grout	Hassam	4
Lewiston.....	4,000†	{ 2.42† 2.59**	grout	conc.	....
Portland.....	3,861*†	2.53†	grout	conc.	4
Massachusetts:					
Rockland.....	1,659†	2.53†	grout	....	....
Brooklyn:					
Brooklyn.....	4,731	{ 3.50\$ 1.80	grout	conc.	4
Cambridge.....	7,031†	2.60*	on old base	conc.	6
Haverhill.....	2,190†	2.85†	grout	laid on old base	....
Lawrence.....	5,249†	....	grout	....	....
Lynn.....	16,787†	3.50	grout	conc.	6
Lowell.....	3,100†	....	grout	rolled subgrade	....
New Bedford.....	13,500*	4.25*	grout	conc.	4
No. Adams.....	322*	4.4	grout	laid on old base	....
Revere.....	1,250†	4.10††	grout	conc.	6
Somerville:					
Somerville.....	10,718*	{ 2.52†† 3.80*	grout	conc.	....
Woburn.....	10,255*	3.60*	grout	conc.	5
Worcester.....	15,180†	3.40*	grout	conc.	5
Michigan:					
Detroit.....	1,230*	4.48\$	grout	conc.	6-8
Missouri:					
Kansas City.....	2,540	4.20\$	grout	conc.	8
Nebraska:					
Omaha.....	22,327*	2.04*	grout	conc.	6
New Hampshire:					
Nashua.....	389†	1.00	grout	no base	....
New Jersey:					
Bayonne.....	18,900*	3.90\$	grout	conc.	6
Camden.....	2,23*	3.76*	grout	conc.	6
Elizabeth.....	1.3*	3.45*	grout	conc.	6
Newark.....	24,859*	....	grout	conc.	6

BRICK PAVEMENTS.

City and State.	Yards Laid in 1917.	Aver. Cost per Yard.	Depth of Cushion.	Kind of Filler.	Kind of Base.	Thickness of Base.	Cost of Base.
Alabama:							
Gadsden.....	550*	\$2.19\$	1	grout	conc.	3 1/2	....
Tennessee:							
Troy.....	30,000	3.43 ¹	monolithic	grout	conc.	4	....
California:							
Berkeley.....	1,650*	3.25*	1	grout	conc.	4	....
Delaware:							
Wilmington.....	31,300*	2.75*	1	grout	conc.	5	....
Florida:							
Palatka.....	12,544*	1.53	....	grout	sand	....	....
St. Petersburg.....	17,000*	1.43\$	....	grout	sand	....	....
Illinois:							
Springfield.....	48,300	1.88\$	....	grout	conc.	4	....
Indiana:							
Alton.....	4,400*	2.30*	2	{ grout and asphalt	conc.	6	....
Mississippi:							
Memphis.....	2,700†	2.50*	1	pitch	conc.	5	....
Missouri:							
St. Paul.....	9,500	1.55\$	1 1/2	sand	earth	....	....
Nebraska:							
Lincoln.....	1,018*	1.75\$	1	grout	conc.	4	....
New York:							
Albany.....	1,330*	3.75\$	....	grout	conc.	6	....
Amsterdam.....	5,500*	3.95\$	....	grout	conc.	6	....
Buffalo.....	10,113*	5.59††	....	grout	conc.	6	....
Ohio:							
Cincinnati.....	1,330*	3.86\$	....	grout	conc.	6	....
Cleveland.....	1,330*	3.81\$	....	grout	conc.	6	....
Oregon:							
Corvallis.....	4,083	....	....	grout	conc.	5*	....
Pennsylvania:							
McKeesport.....	640*	1.54\$	....	grout	conc.	3	....
Philadelphia.....	2,118*	4.23\$	....	grout	conc.	6	....
Pittsburgh.....	27,501*	4.00\$	....	grout	conc.	6	....
Rhode Island:							
Pawtucket.....	5,850*	3.60\$	....	grout	conc.	6	....
Tennessee:							
Memphis.....	3,638*	3.96\$	....	grout	conc.	5	....
Virginia:							
Danville.....	1,700†	.77	....	grout	old base	....	....
Wisconsin:							
Milwaukee.....	19,274*	3.62\$	....	grout	conc.	6	....

* By contract; † by municipality; ‡ includes grading; § includes base and grading; ¶ includes completed pavement; †† recut blocks; ††† large blocks; ††† split blocks; ††† repaving; ††† old blocks furnished city free.

City	Amount	Material	Quantity	Unit	Price	Notes
Champaign	34,222	grout and asphalt	1 1/2	cu. yd.	1.725-1.925	
Chicago	447,094	grout	1	cu. yd.	2.768	
Chicago Heights	35,800	grout	1	cu. yd.	2.908	
Decatur	16,355	grout	1	cu. yd.	2.008	
East St. Louis	37,675	grout	1	cu. yd.	1.938	
Evanston	49,652	grout	1	cu. yd.	1.938	
Flora	18,086	grout	1	cu. yd.	1.938	
Freeport	18,000	grout	1	cu. yd.	1.938	
Gibson City	13,900	grout	1	cu. yd.	1.938	
Gillespie	12,250	grout	1	cu. yd.	1.938	
Granite	48,000	grout	1	cu. yd.	1.938	
Marion	8,620	grout	1	cu. yd.	1.938	
Oak Park	34,145	grout	1	cu. yd.	1.938	
Pekin	24,646	grout	1	cu. yd.	1.938	
Peoria	21,327	grout	1	cu. yd.	1.938	
Pontiac	2,611	grout	1	cu. yd.	1.938	
Springfield	32,677	grout	1	cu. yd.	1.938	
Sterling	9,438	grout	1	cu. yd.	1.938	
Streator	18,000	grout	1	cu. yd.	1.938	
Waukegan	9,200	grout	1	cu. yd.	1.938	
Indiana:						
Anderson	8,000	grout	1	cu. yd.	2.308	
Crawfordsville	16,147	grout	1	cu. yd.	1.247	
Fort Wayne	9,413	grout	1	cu. yd.	2.008	
Frankfort	8,636	grout	1	cu. yd.	1.978	
Indianapolis	3,671	grout	1	cu. yd.	3.168	
Madison	8,000	grout	1	cu. yd.	2.258	
Marion	5,043	grout	1	cu. yd.	2.258	
New Albany	14,056	grout	1	cu. yd.	2.168	
Richmond	5,360	grout	1	cu. yd.	2.408	
South Bend	7,107	grout	1	cu. yd.	2.308	
Terre Haute	1,671	grout	1	cu. yd.	2.308	
Iowa:						
Burlington	10,352	grout	1	cu. yd.	2.078	
Cedar Rapids	26,200	grout	1	cu. yd.	2.278	
Davenport	23,565	grout	1	cu. yd.	2.008	
Des Moines	33,371	grout	1	cu. yd.	2.258	
Glenwood	32,000	grout	1	cu. yd.	2.388	
Iowa City	17,983	grout	1	cu. yd.	1.988-2.548	
Muscatine	1,560	grout	1	cu. yd.	1.808	
Kansas:						
Arkansas City	15,671	grout	1	cu. yd.	1.818	
Beloit	60,892	grout	1	cu. yd.	2.158-2.288	
Cherryvale	14,000	grout	1	cu. yd.	2.148	
Columbus	12,668	grout	1	cu. yd.	1.788	
Council Grove	46,600	grout	1	cu. yd.	1.908	
Fort Scott	8,400	grout	1	cu. yd.	1.658	
Independence	25,200	grout	1	cu. yd.	2.338	
Kansas City	5,019	grout	1	cu. yd.	2.158	
Neodesha	28,200	grout	1	cu. yd.	1.728	
Ottawa	4,000	grout	1	cu. yd.	1.578	
Parsons	26,240	grout	1	cu. yd.	1.758-3.008	
Pittsburg	4,251	grout	1	cu. yd.	1.838	
Pratt	90,000	grout	1	cu. yd.	2.118	
Salina	3,333	grout	1	cu. yd.	1.908-2.028	
Topeka	7,700	grout	1	cu. yd.	2.188	
Kentucky:						
Louisville	21,034	grout	1	cu. yd.	1.758	
Maysville	50,507	grout	1	cu. yd.	1.21	
Louisiana:						
Lake Charles	10,500	grout	1	cu. yd.	2.258	
Maryland:						
Cumberland	10,883	grout	1	cu. yd.	2.258	
Massachusetts:						
No. Adams	3,675	grout	1	cu. yd.	2.978	
Somerville	1,658	grout	1	cu. yd.	2.978	
Michigan:						
Ann Arbor	2,666	grout	1	cu. yd.	1.50	
Battle Creek	9,525	grout	1	cu. yd.	2.158	
Detroit	23,005	grout	1	cu. yd.	2.988	
Flint	23,000	grout	1	cu. yd.	1.304	
Grand Rapids	18,615	grout	1	cu. yd.	1.158	
Kalamazoo	14,185	grout	1	cu. yd.	2.438	
Minnesota:						
Beaumont	18,200	grout	1	cu. yd.	1.658	
Bradford	7,608	grout	1	cu. yd.	2.578	
Carlisle	1,400	grout	1	cu. yd.	2.318	
Dickson City	4,550	grout	1	cu. yd.	2.538	
Duquesne	3,562	grout	1	cu. yd.	2.038	
Farrell	5,000	grout	1	cu. yd.	2.168	
Franklin	5,359	grout	1	cu. yd.	2.375	
Greensburg	5,359	grout	1	cu. yd.	1.608	
Nebraska:						
Lincoln	30,836	grout	1	cu. yd.	1.788	
Omaha	374,411	grout	1	cu. yd.	2.398	
Red Cloud	14,875	grout	1	cu. yd.	2.508	
New Jersey:						
Atlantic City	6,009	grout	1	cu. yd.	1.78	
Newark	1,207	grout	1	cu. yd.	2.788	
Plainfield	22,000	grout	1	cu. yd.	2.758	
New York:						
Albany	9,000	grout	1	cu. yd.	2.508	
Amsterdam	1,500	grout	1	cu. yd.	2.548	
Auburn	11,233	grout	1	cu. yd.	2.018	
Binghamton	9,905	grout	1	cu. yd.	2.448	
Buffalo	39,449	grout	1	cu. yd.	3.648	
Elmira	9,602	grout	1	cu. yd.	2.668	
Jamestown	15,263	grout	1	cu. yd.	2.398	
New York:						
Richmond	6,546	grout	1	cu. yd.	2.40	
Niagara Falls	9,862	grout	1	cu. yd.	3.378	
No. Tonawanda	14,000	grout	1	cu. yd.	2.888	
Olean	19,550	grout	1	cu. yd.	1.49	
Oswego	6,058	grout	1	cu. yd.	3.158	
Rensselaer	4,472	grout	1	cu. yd.	2.288	
Syracuse	10,414	grout	1	cu. yd.	2.388	
White Plains	1,070	grout	1	cu. yd.	3.908	
North Carolina:						
New Bern	2,500	grout	1	cu. yd.	1.708	
North Dakota:						
Fargo	6,050	grout	1	cu. yd.	2.508	
Ohio:						
Bellevue	420	grout	1	cu. yd.	1.358	
Bucyrus	26,900	grout	1	cu. yd.	2.308	
Cincinnati	10,419	grout	1	cu. yd.	2.768	
Cleveland	235,629	grout	1	cu. yd.	1.80	
Coshocton	15,713	grout	1	cu. yd.	1.728	
Defiance	2,000	grout	1	cu. yd.	2.258	
Delaware	3,700	grout	1	cu. yd.	1.718	
El Liverpool	10,804	grout	1	cu. yd.	2.228	
Findlay	3,079	grout	1	cu. yd.	2.138	
Fostoria	12,000	grout	1	cu. yd.	2.808	
Fremont	25,330	grout	1	cu. yd.	1.938	
Greenville	17,396	grout	1	cu. yd.	1.508	
Lancaster	4,488	grout	1	cu. yd.	2.458	
Lima	33,366	grout	1	cu. yd.	2.408	
Lorain	8,000	grout	1	cu. yd.	2.408	
Marion	18,180	grout	1	cu. yd.	1.518	
Marietta	12,000	grout	1	cu. yd.	1.50	
Newark	2,873	grout	1	cu. yd.	2.128	
Nowood	20,100	grout	1	cu. yd.	2.008	
Piqua	48,000	grout	1	cu. yd.	1.798	
Port Clinton	16,500	grout	1	cu. yd.	2.608	
St. Bernard	16,200	grout	1	cu. yd.	1.84	
Sandusky	3,200	grout	1	cu. yd.	1.84	
Springfield	18,000	grout	1	cu. yd.	2.358	
Steubenville	15,400	grout	1	cu. yd.	2.628	
Toledo	32,333	grout	1	cu. yd.	1.50-1.75	
Washington	14,600	grout	1	cu. yd.	1.908	
Westerville	3,800	grout	1	cu. yd.	1.908	
Xenia	58,995	grout	1	cu. yd.	2.608	
Youngstown	5,650	grout	1	cu. yd.	1.908	
Zanesville	5,650	grout	1	cu. yd.	2.478	
Oklahoma:						
Elk City	2,158	grout	1	cu. yd.	2.158	
Pennsylvania:						
Beaver Falls	18,200	grout	1	cu. yd.	1.658	
Bradford	7,608	grout	1	cu. yd.	2.578	
Carlisle	1,400	grout	1	cu. yd.	2.318	
Dickson City	4,550	grout	1	cu. yd.	2.538	
Duquesne	3,562	grout	1	cu. yd.	2.038	
Farrell	5,000	grout	1	cu. yd.	2.168	
Franklin	5,359	grout	1	cu. yd.	2.375	
Greensburg	5,359	grout	1	cu. yd.	1.608	

BRICK PAVEMENTS (Continued).

City and State.	Yards Laid in 1917.	Av. Cost Per Yard.	Depth of Cushion.	Kind of Filler.	Kind of Base.	Thickness of Base.	Cost of Base.
Pennsylvania (Continued):							
Jeannette	15,003†	1.875*	1 1/2	sand	slag	6	....
Johnstown	11,759*	2.42*	1 1/2	grout	conc.	6	....
Lebanon	9,800	2.57*	1 1/2	grout	conc.	5	....
McKeesport	2,700*	1.875	1 1/2	grout	conc.	8 1/2	....
Norristown	3,000*	2.39*	1	grout	conc.	4 1/2	....
No. Braddock	2,000*	2.00-2.11	1	sand	conc.	5	....
Oil City	9,913	3.003\$	1	grout	conc.	4	....
Philadelphia	56,730*	2.608\$	1 1/2	grout	conc.	6	....
Pittsburgh	2,414*	2.348\$	1 1/2	grout	conc.	6	....
Pittston	9,000*	2.333\$	1 1/2	grout	conc.	6	....
Reading	1,050*	2.57†	2	grout	conc.	6	....
Shamokin	1,000*	3.30**	1 1/2	grout	conc.	6	....
West Berwick	20,000*	2.19*	1 1/2	grout	conc.	5	....
Wilkes-Barre	370*	2.45*	...	grout	conc.	6	....
Williamsburg	6,542*	3.258\$	1/2-1	grout	conc.	6-8	....
Williamsport	2,417*	2.328\$	1/2-1	grout	conc.	6	....
Williamsport	2,720*	2.168\$	1/2-1	grout	conc.	6	....
Williamsport	17,249*	2.42*	1/2-1	grout	conc.	6	....
Tennessee:							
Jackson	32,985*	2.05\$	1	grout	conc.	4	....
Texas:							
Temple	32,500	1.82\$	1 1/2	asphalt	conc.	4	....
Virginia:							
Charlottesville	540†	....	2	grout	....	....	....

* By contract; † by municipality; ‡ includes grading; § includes base; ¶ includes base and grading; ** includes completed pavement; †† hillside block laid under difficult conditions; ‡‡ laid in street railway track; §§ 2 1/2-inch brick; ¶¶ 3-inch brick; ††† includes removal of old asphalt paving, including old concrete base, and cost of constructing new base.

WATERBOUND MACADAM AND SURFACING OILING.

City and State	Amount laid in 1917	Av. cost per yard	Thick-ness of macadam, inches	Is Tel-ford base Used?	Miles or yards oiled in 1917	Cost per yard
New Hampshire:						
Franklin	5,333†	1.00	4	partly	5	.50
Laconia	....	....	....	....	111,044	.292
Nashua	....	....	....	....	10	.10
New Mexico:						
Roswell	....	....	....	....	11,847	.089
New Jersey:						
East Orange	3,000	....	....	....	750,000	.03
Irvington	....	....	....	....	13.2	305.05
Madison	....	....	....	....	20	135.00
Montclair	....	....	....	....	3	350.00
Newton	....	....	....	....	121,526	.03
Nutley	....	....	....	....	950,000	.01
Orange	....	....	....	....	29.9	.034
Plainfield	....	....	....	....	20,000	.04
Ridgefield Park	7,500*	.95	6	no	1,600	.12
Rutherford	7,800*	.75	4	no	9	.18
Westfield	....	....	....	....	225,000	.03
West Orange	....	....	....	....	14	169.00
New York:						
Albany	25,900†	1.25	....	no	220,476	.018 1/2
Auburn	....	....	....	....	14	228.00
Binghamton	....	....	....	....	163,206	.03
Buffalo	....	....	....	....	196,352	.03
Corning	....	....	....	....	61	144.55
Elmira	....	....	....	....	33,875	.132
Fulton	....	....	....	....	8	406.00
Geneva	....	....	....	....	295,000	.01 3/4
Glens Falls	....	....	....	....	66,000	.018 1/2
Haverstraw	....	....	....	....	34,000	.02 1/2
Little Falls	300†	.90	4	no	88,000	.02 1/2
New York City:	15,570*	1.32	....	no	1,240,000	.03 1/8
Bronx	....	....	....	....	1,632,710	.03 1/8
Brooklyn	....	....	....	....	84,000*	.01 1/2
Manhattan	....	....	....	....	84,000	.04
Queens	....	....	....	repairs only	60	....
Niagara Falls	6,059†	.25	....	....	....	....

[illegible]

*Work done by contract; †, by municipality; ‡, prices include grading; 1, per front foot for one application; 2, labor cost only; 3, two applications; 4, dirt road treatment; 5, price per foot; 6, work was outside city limits; 7, bituminous surface layer placed on concrete.

CREOSOTED WOOD BLOCK PAVEMENTS.

City and State.	Yds. laid in 1917.	Av. cost per sq. yd.	Preservative of Lbs. of Sp. gr. of	Kind.	Base Thickness.	Cost.
Connecticut:						
New Haven.....	29,359*	....	20	1.08-1.14	....	....
Delaware:						
Wilmington.....	1,806*	\$3.80†	laid along car tracks	Conc.	5	....
Illinois:						
Moline.....	5,781*	3,095‡	16	1.07-1.12	....	....
Iowa:						
Dubuque.....	30,882*	2.05	..	..	used old base	....
Kentucky:						
Louisville.....	{ 608† 2,527* }	2.78‡	16	1.07	Conc.	6
Louisiana:						
Paducah.....	5,524	2.16	16 { On old base. Cost includes removing	1.10	Conc.	6
Massachusetts:						
New Orleans.....	50,500*	2.02‡	16 { old pave. and putting in mortar cushion	1.10	Conc.	6
Michigan:						
New Bedford.....	3,218†	....	..	....	....	....
Minnesota:						
Detroit.....	17,275*	4.38‡	16-20	1.10	Conc.	6-8
Missouri:						
St. Paul.....	167,500†	2.85†	16	1.10	Conc.	5
New Jersey:						
Kansas City.....	53,340	3.20‡	16	....	Conc.	8
New York:						
East Orange.....	13,950	3.72†	3½-in. blocks	....	Conc.	6
Ohio:						
Jersey City.....	13,045*	2.75‡	20	1.03-1.10	Conc.	5
Pennsylvania:						
Newark.....	41,147*	3.44†	17	1.07-1.12	Conc.	6
Wisconsin:						
Orange.....	25,500*	2.25	17	1.07-1.12	....	1.00
City and State.	Yds. laid in 1917.	Av. cost per sq. yd.	Preservative of Lbs. of Sp. gr. of	Kind.	Base Thickness.	Cost.
New York:						
Buffalo.....	1,616*	4.46**	16	....	....	....
Ohio:						
Cincinnati.....	6,380*	3.43†	16	1.06-1.07	Conc.	5½
Pennsylvania:						
Lima.....	1,812*	3.60‡	16	....	Conc.	7
Wisconsin:						
Norwood.....	12,500*	2.90‡	18	1.13	Conc.	6
Ohio:						
Toledo.....	18,181*	3.10	16	1.06	Conc.	6
Pennsylvania:						
Lebanon.....	9,500	3.88†	18	1.08-1.14	Conc.	5
Ohio:						
Olyphant.....	400*	2.75	16	laid on bridge	Conc.	6
Pennsylvania:						
Philadelphia.....	2,230*	3.57‡	16	1.03-1.08	Conc.	6
Pittsburgh:						
Pittsburgh.....	2,700*	3.80††	16	....	Conc.	6
South Dakota:						
Mitchell.....	223*	3.30‡	..	....	Conc.	6
Texas:						
San Angelo.....	38,000†	.65	old blocks relaid with asphalt filler	....	Conc.	5-6
Washington:						
Seattle.....	.52*	2.50‡	12	1.04	Conc.	5-6
Wisconsin:						
Eau Claire.....	6,300†	3.43‡	..	....	Conc.	6
Wisconsin:						
Milwaukee.....	25,872*	2.46‡	23	1.1	Conc.	6

*By contract; †by municipality; ‡includes grading; ††repaving work.

cludes base; **includes completed pavement; †repaving work.

SHEET ASPHALT.

City and State.	Yards Laid in 1917	Average cost per sq. yard	Thick-ness of surface	Thick-ness of binder	Kind.	Base Thickness.	Cost.
California:							
Los Angeles.....	235,145*	\$0.99†-1.49‡	1½-2	Paint-1	conc.	4-6	....
Oakland:							
Petaluma.....	26*	1.80‡	1½	2	Repeating	6	....
San Francisco:							
San Francisco.....	3,500*	.39	1½	....	conc.	6	....
Santa Barbara:							
Santa Barbara.....	50,000*	1.81‡	....	....	conc.	4-6	....
Connecticut:							
Hartford.....	60,000*	1.51†	1½	1½	conc.	6	....
Delaware:							
New Haven.....	38,068*	1.85‡	1½	1½	conc.	6	....
Delaware:							
Wilmington.....	59,632*	{ 2.43† 1.63‡ }	1½	1½	mac.	6	....
Dist. of Columbia:							
Washington.....	{ 66,000 10,200 }	{ 1.52† 2.20† }	2	2	conc.	5	....
Illinois:							
Aurora.....	110,000	1.44‡	2½	2	conc.	5	....
Indiana:							
Evansville.....	35,027*	1.76‡	1½	1½	conc.	6	....
Massachusetts:							
Moline.....	3,580*	1.63‡	1½	1½	mac.	5	....
Indiana:							
Fort Wayne.....	4,732*	1.81‡	2	1½	....	5	....
South Bend:							
South Bend.....	53,163*	1.85‡	1½	1½	conc.	6	....
Iowa:							
Cedar Falls.....	{ 32,243* 30,820 }	{ 1.89† 1.99† }	1½-2	2	conc.	5-6	....
Independence:							
Independence.....	53,294*	1.51‡	1½	1	conc.	5	....
Massachusetts:							
Mason City.....	40,000*	1.79†	1½	1	conc.	5	....
Kentucky:							
Louisville.....	{ 19,950† 14,060 }	{ 1.79† 1.45 }	2	1	conc.	6	....
Massachusetts:							
Maysville.....	17,000*	1.45	....	....	conc.	6	....
New Orleans:							
New Orleans.....	9,600*	1.84‡	1½	1½	conc.	6	....
Peabody:							
Peabody.....	13,400*	1.60†	1	3	....	....	....
City and State.	Yards Laid in 1917	Average cost per sq. yard	Thick-ness of surface	Thick-ness of binder	Kind.	Base Thickness.	Cost.
Buffalo:							
Buffalo.....	{ 106,357* 107,060* }	{ 3.47 3.94‡ }	2	2	conc.	6-9	....
Syracuse:							
Syracuse.....	35,228*	2.01‡	2	1	conc.	6	....
White Plains:							
White Plains.....	40,269*	1.70†	1	3	old base used	6	....
Asheville:							
Asheville.....	5,244*	1.32	....	....	conc.	6	....
North Dakota:							
Bismarck.....	129,740*	1.90‡	1½	1	conc.	5	....
Ohio:							
Cincinnati.....	8,485*	2.60‡	1½	1½	conc.	6	....
Findlay:							
Findlay.....	18,770	1.90‡	1½	1	conc.	6	....
Lakewood:							
Lakewood.....	26,274	1.87†	1½	1	conc.	6	....
Lima:							
Lima.....	3,501*	1.08	2	1	conc.	6	1.15-1.23
Lorain:							
Lorain.....	34,545*	2.25‡	1½	1	conc.	6	....
Marion:							
Marion.....	35,000*	3.10‡	1½	1	conc.	6	....
Springfield:							
Springfield.....	45,000*	1.26	2	1	conc.	6	....
Toledo:							
Toledo.....	141,000*	2.30	2	1	repaving	....	....
Washington C. H.:							
Washington C. H.....	{ 2,985* 58,159* }	{ 1.55 2.41‡ }	1½	1½	conc.	6	....
Xenia:							
Xenia.....	30,167*	3.22†	1½	1	conc.	6	....
Pennsylvania:							
Harrisburg.....	10,526*	1.90†	2	1	conc.	6	....
Johnstown:							
Johnstown.....	19,330*	2.23†	2	1	conc.	6	....
Philadelphia:							
Philadelphia.....	18,433*	2.24‡	1½	1	conc.	6	....
Pittsburgh:							
Pittsburgh.....	{ 52,708* 11,737* }	{ 2.60† 2.83† }	1½	1½	repaving work	....	....
Reading:							
Reading.....	21,410*	1.50	1½	1	resurfacing	6	....
Seranton:							
Seranton.....	8,327*	2.17†	2	1	conc.	6	....
Wilkes-Barre:							
Wilkes-Barre.....	57,846*	2.16†	....	....	conc.	6	....
Williamsport:							
Williamsport.....	9,250*	1.32†	....	....	....	....	....
Rhode Island:							
Providence.....	35,635*	{ 2.39† 2.63† }	1½-2	1-1½	conc.	6	....
South Carolina:							
Greenville.....	3,000*	2.15†	2	1	conc.	4	....
South Dakota:							
Madison.....	20,000	1.85‡	....	....	conc.	4	....

City and State	Yards laid in 1917	Average Cost per sq. yd.	Thick-ness of surface, inches	Kind	Base Thickness	Cost
Michigan:						
Detroit	55,714	3.15	2	1 1/2	conc.	6-8
Flint	18,000	1.75	1 1/2	1	conc.	6
Grand Rapids	11,245	1.24	3	...	conc.	5
Mississippi:						
Laurel	14,797	1.60	1 1/2	none	conc.	4
Vicksburg	702	2.15	2	...	conc.	...
Missouri:						
Kansas City	14,740	2.17	2	2	conc.	6
Nebraska:						
Grand Island	58,000	1.75	1 1/2	1 1/2	conc.	4
Hastings	50,000	1.84	1 1/2	1 1/2	conc.	4
Lincoln	50,333	1.90	1 1/2	1 1/2	conc.	5
New Jersey:						
Atlantic City	64,913	0.95	1 1/2	1 1/2	conc.	6
Bayonne	31,200	2.25	1 1/2	1 1/2	conc.	5
Camden	1,898	2.20	1 1/2	1 1/2	conc.	6-8
Elizabeth	0.4	2.60	1 1/2	1 1/2	conc.	6
Newark	49,232	2.37	1 1/2	1 1/2	conc.	6
New York:						
Bronx	149,600	1.47	2	1	conc.	6
Brooklyn	20,256	2.34	2	1	conc.	6
Manhattan	278,191	1.72	1 1/2	1 1/2	conc.	6
Albany	14,500	2.10	2	1	conc.	6

*By contract; †by municipality; ‡includes grading; §includes base; §includes curbs, gutters and other items, everything.

BITUMINOUS CONCRETE PAVEMENTS.

City and State	Yards laid in 1917	Average Cost per sq. yd.	Thick-ness of surface, inches	Kind	Base Thickness	Cost
Alabama:						
Gadsden	40,632	\$1.50	2	conc.	5	...
Arkansas:						
Fort Smith	1 1/2	1.18	...	old mac.	10-12	\$0.60
California:						
Berkeley	126,000	1.44	2	conc.	5-6	...
Los Angeles:						
Marysville	123,656	1.31	1 1/2	conc.	4	...
San Jose	48,404	1.35	1 1/2	conc.	4	...
Stockton	2,200	1.44	1 1/2	conc.	4	...
Colorado:						
Boulder	26,000	1.00	2	conc.	5	...
Connecticut:						
Derby	7,500	1.75	warrenite	stone	6	...
Illinois:						
Berwyn	48,000	1.80	2	conc.	6	...
Chicago	14,305	2.00	2	conc.	6	...
Chicago Heights	28,000	1.28	2	conc.	6	...
Evanston	2,742	1.28	2	conc.	6	...
Oak Park	12,285	1.28	2	conc.	6	...
Peoria	10,142	1.67	2	conc.	6	...
Springfield	24,837	1.90	2 1/2	conc.	6	...
Indiana:						
Fort Wayne	56,848	1.74	2	conc.	6	...
Frankfort	5,534	1.56	2	conc.	6	...
Indianapolis	2,400	2.40	2	conc.	6	...
South Bend	70,663	1.56	2	conc.	6	...
Iowa:						
Algona	44,040	1.53	2	conc.	4	...
Boone	11,500	1.60	2	conc.	4	...
Cedar Falls	11,114	1.50	2	conc.	4	...
Cedar Rapids	13,200	1.68	2	conc.	4	...
Dubuque	1,800	1.80	2	conc.	4	...
Fayette	15,000	1.89	2	conc.	4	...

*By contract; †by municipality; ‡includes grading; §includes base; §includes curbs, gutters and other items, everything.

BITUMINOUS CONCRETE PAVEMENTS (Continued).

City and State	Yards laid in 1917	Average Cost per sq. yd.	Thickness of surface, inches	Kind	Base Thickness	Cost
New Jersey:						
Elizabeth	0.6*	2.30	3	conc.	4	.....
Jersey City	568*	1.79	3	conc.	5	.....
Rutherford	20,870*	3.11	2 1/2	conc.	5	.....
West Hoboken	18,233*	1.50	2 1/2	conc.	5	.....
West New York	18,841*	2.38	2	conc.	5	.....
New York:						
Albany	1,600	1.90	2	conc.	6	.....
New York City:						
Bronx	21,450*	1.17	2	conc.	4	.....
Manhattan	6,717*	1.60	2	conc.	4	.....
Queens	75,186*	1.15	2	conc.	6	.....
Richmond	110,514*	1.15	2	conc.	6	.....
Niagara Falls	4,623*	2.58	2	conc.	6	.....
Schenectady	7,721*	2.49	2	conc.	6	.....
Utica	7,80*	3.37	2	conc.	6	.....
North Carolina:						
Asheville	49,722*	1.05	2	old mac or bit.	..	.....
Winston-Salem	37,236*	1.43	2	conc.	6	.....
Ohio:						
Cleveland	38,694*	1.30	2	conc.	6	.....
Findlay	7,547	1.65	2	conc.	6	.....
Hamilton	5,940	1.73	2	conc.	6	.....
Lakewood	23,861*	1.30	2	conc.	6	.....
Lima	20,604*	1.95	2	conc.	6	.....
Newark	6,805	1.85	2	conc.	6	.....
Springfield	17,000*	2.15	2	conc.	6	.....
Toledo	13,950*	2.10	2	conc.	6	.....
Wapakoneta	12,602*	2.10	2	conc.	6	.....
Youngstown	20,300*	2.10	2	conc.	6	.....
Oregon:						
Ashland	10,201	1.48	2	conc.	4	.....
Eugene	2,000*	1.65	1 1/2	conc.	4	.....
Salem	33,724*	.45	1 1/2	conc.	4	.....
Philadelphina:	19,964*	.60	2	mac. redressed	..	.....
Pennsylvania:						
Philadelphia	1,56*	1.68	2	.....	..	.....
South Carolina:						
Greenville	55,000*	1.69	2	conc.	4	.....
South Dakota:						
Mitchell	28,101*	1.80	2	conc.	5	.....
Sioux Falls	27,135*	1.72	2	stone	8	.....
Tennessee:						
Dyersburg	20,000	1.62	2	conc.	4	.....
Greenville	8,37*	1.47	2	conc.	5	.....
Murfreesboro	58,000*	1.14	2	stone	..	.....
Texas:						
Temple	11,320	1.37	2	conc.	4	.....
Waxahachie	25,000	1.40	2	conc.	5	.....
Vermont:						
St. Albans	1,446*	1.10	2	stone	3	.....
Washington:						
Seattle	0.36*	1.60	2	conc.	5-6	.....
Yakima	52,115*	1.21	2	conc.	4	.....
Wisconsin:						
Beloit	9,780*	1.18	2	conc.	5	.....
Janesville	20,561*	1.51	2	conc.	5	.....
Milwaukee	81,467*	1.62	2	conc.	5	.....
Oshkosh	49,786	1.96	2	conc.	5-6	.....

* By contract; †, by municipality; ‡ includes cost of grading; § includes cost of base and grading; || includes cost of base; ¶ includes all costs necessary for completed pavement; †, repaving; ‡, Topeka; §, surface done by contract; base by city; ¶, natural pavement.

BITUMINOUS MACADAM.

City and State.	Yards Laid in 1917.	Average Cost Per Sq. Yd.	Thickness of Macadam.	Gallons Per Sq. Yd.
California:				
Alameda	700*	\$0.85†	3-6	1 1/2
Los Angeles	5,544*	.63-.99	3-6	1.83
Oakland	7.5*	.75	4-5-6	1 1/2
Pasadena	17,396*	.67	1	1 1/2
Petaluma	30,000*	.45	1	1 1/2
Pomona	5,861†	.31	1	1 1/2
Redlands	45,000†	.45	5	1 1/4
Richmond	8,341*	.45	6	2
Riverside	19,800*	.63†-.81†	4	1
Santa Ana	23,880*	.45	2	3/4
Santa Monica	11,018*	.57	4	1
Connecticut:				
Ansonia	800	1.43	8	2 1/2
Greenwich	4,000*	1.25	4	2 1/2
New Haven	5,043*	1.10	6	2 1/2
Stamford	3,400†	.75	5	2 1/2
Wallingford	1,000†	1.50	.....	2 1/2
Illinois:				
Ardmore	23,000*	1.27	.....	2
Chicago	327,982*	1.46	10 1/2	2
Evanston	12,854*	.83	3	2
Freeport	15,000*	.70	9	1
Hinsdale	8,500*	1.39	.....	2
Marion	7,000*	1.62	.....	3 1/4
Peoria	30,000*	1.19	.....	2.2
Waukegan	1,923*	1.30	2 1/2	2 1/4
Indiana:				
Crown Point	10,000	1.80†	6	2
Frankfort	18,700†	.58 1/2	2	2
Gary	5,677*	1.73	.....	2
Hartford City	37,000	1.30	.....	2
Marion	2,650*	.828	4	2 1/2
Kansas:				
Leavenworth	45,600	1.47	3	2 1/2
Osawatimie	2,100*	.....	9	3
Rosedale	2,225*	1.00†	8-12	1 1/2
Maine:				
Bath	2,500†	1.25†	2	2
Portland	5,693	2.33	.....	2-2 1/2
So. Portland	2,450	1.25	6	2 1/2-3
Maryland:				
Cumberland	2,016†	.....	6	2
Massachusetts:				
Arlington	32,145	.....	4	2
Brockton	31,821†	1.60	5	2 1/4
Cambridge	51,176†	.75†-1.00†	6	1 1/2
Lawrence	2,080†	.....	.....	3
Lowell	33,687†	.....	5	2 1/2
Lynn	24,522†	1.20	4	.....
Marlboro	5,775†	.71	3	2.4
New Bedford	45,500†	.....	6	2 1/4
Newton	42,000†	1.00†	2 1/2	2
Norwood	7,000†	.90**	6	2 1/2
Peabody	43,400*	.96	3	2 1/2
Revere	14,000†	1.27**	6	2 1/4
Somerville	1,083*	1.01	5	2
Waltham	17,620†	1.07	6	3
Webster	2,021†	1.40	10	1 1/2
Worcester	35,356†	.98	6	2 1/4
Michigan:				
Grand Rapids	3,115*	1.20	3	2
Holland	14,000†	.82	2	2 1/2
Marquette	1,266†	.67	2 1/2	2
Missouri:				
Boonville	5,000*	1.26	2 1/2	2 1/5
Excelsior Spgs.	11,000	.80†	3	2 1/4
Kansas City	18,000	1.21	10	2-3
Monett	16,000*	1.20	.....	2.2
Springfield	2,262	1.24 3/4	2 1/2	2.2
New Hampshire:				
Laconia	7,715†	1.15†	6	2 1/4
New Jersey:				
Garfield	3,190*	1.10†	7	1 1/2
Madison	5,205*	1.38	4	1 1/2
Montclair	1,481*	1.49	3	2
Ridgewood	5,600*	.54	4	.....
Rutherford	4,320*	1.12**	.....	2 1/4
Westfield	40,000*	0.91†	6	3/4
West Orange	4,300*	1.06-1.51	7	1 1/2
New York:				
Auburn	6,200†	1.35†	.....	1 1/2-2
Binghamton	35,200†	1.35†	4	2
Little Falls	2,345*	1.60†	6	2 1/2
New York City:				
Queens	80,332*†	.....	6 1/2	2 1/3
Richmond	27,516*	1.54	.....	1 1/4
Ogdensburg	760†	1.39	9	2
Syracuse	16,621*	.....	.....	.....
Ohio:				
Cincinnati	908*	1.55†	9	2-2 1/2
Findlay	2,896	.80	7	2 1/2
Hamilton	4,330	1.23†	2 1/2	2 1/4
Norwood	12,100*	.90	9	2-3 1/2
Pennsylvania:				
Norristown	3,900†	.59 1/2†	5-8	1 1/2-2
Philadelphia	2 1/4	2.45	.....	2 1/4
Waynesboro	2,500†	.79**	3	2 1/4
Rhode Island:				
Providence	11,686†	.....	7 1/2	1 3/4-2 1/4
Woonsocket	1†	.....	4-6	.....
Tennessee:				
Memphis	3,510†	.75	.....	.....

BITUMINOUS MACADAM (Continued).

City and State.	Yards Laid in 1917.	Average Cost Per Sq. Yd.	Thickness of Macadam.	Gallons Per Sq. Yd.
Texas:				
Longview	5,000†	.76‡	6	2
San Angelo.....	42,000	....	....	....
Virginia:				
Charlottesville ..	5,000*	....	8	2½
Danville	2,700†	.73‡	2	3
West Virginia:				
Bluefield	9,571	1.50‡	2½	2½
Wisconsin:				
Janesville	10,738*	1.36	2	2½
Madison .....	.04	....	3	2½
Waukesha	2,259*	1.20	....	2
Waupaca	600†	.85‡	....	2½

*By contract; †work done by municipality; ‡cost includes grading; §cost includes base and grading; **cost includes all work necessary to completed pavement.

GRAVEL PAVEMENTS.

City and State.	Yards Laid in 1917.	Aver. Cost Per Sq. Yd.	Was Gravel Rolled?
Alabama:			
Huntsville	62,500†	\$0.11½	....
Montgomery	10,000	.40	No
Selma	10,800*	.78	No
Tuscaloosa	45,000	.60	No
Colorado:			
Colorado Springs...	700,000†	.70	No
Fort Collins.....	16,110	..	Yes
Georgia:			
Rome.....	11‡	.20	Yes
Idaho:			
Pocatello	180,000**	.22	Yes
Indiana:			
Crawfordsville	4,921	.35	No
Terre Haute.....	3,826*	.48	Yes
Iowa:			
Marshalltown	1.6*	.55	Yes
Muscatine	5,700†	.25	Yes
Kansas:			
Cherryvale	54,500*	.15	No
Emporia	¼*	.35	Yes
Kentucky:			
Paducah	½	.41‡	Yes
Louisiana:			
Kentwood	4*	..	No
Maine:			
Augusta	32,000†	1.50	Yes
Gardiner	2,800†	.60	No
Lewiston	1	..	Yes
Waterville	7,000†	..	Yes
Massachusetts:			
Greenfield	13,400	..	Part
Haverhill	6,770†	.11	No
Lowell	17,528†	..	Yes
Newton	3,000†	.15	Yes
North Adams.....	6	..	Yes
Peabody	9,600†	.17	Yes
Revere	5,000†	.40	....
Woburn	91,280†	..	Yes
Michigan:			
Bay City	3¼†	..	No
Grand Rapids.....	2,990*	.78	Yes
Holland	1†	.50	Yes
Marquette	15,000	.10	No
Port Huron	5,000	..	No
Saginaw	10,200	.33	Yes
Minnesota:			
Austin	½	..	No
Faribault	3†	.08	No
Mankato	50,000	..	....
Stillwater	1†	.38	Yes
Mississippi:			
Clarksdale	6,000†	.60‡	No
Columbus	4,390†	.20	Yes
Jackson	1†	..	....
Laurel	1,546*	.50	Yes
Missouri:			
Monett	5,000†	.65‡	Yes
Webb City.....	2*	.22‡	Yes
Montana:			
Miles City.....	3†	500.00‡	No
New Hampshire:			
Franklin	4/5†	.50‡	Yes
Nashua	20,000	.20	Yes
New York:			
Herkimer	3	.60	Yes
Hornell	10†	..	Yes
Mamaroneck	2,000†	1.85‡	Yes
Oneonta	¾†	..	Yes
Rensselaer	2,000*	.28	Yes
Ohio:			
Urbana	2,700*	.70	No
Washington C. H....	9,000†	.20	No
Xenia	2	.30‡	No
Oregon:			
Corvallis	2	..	Yes
Newburg	3,260*	1.50‡	Part
Pennsylvania:			
Freeland	½†	.43‡	Yes
Greenville	1,000†	..	No
South Dakota:			
Mitchell	1.6	1,717.40‡	No
Tennessee:			
Dyersburg	1,000	.50‡	Yes
Jackson	3,555†	..	Yes

GRAVEL PAVEMENTS (Continued).

City and State.	Yards Laid in 1917.	Aver. Cost Per Sq. Yd.	Was Gravel Rolled?
Texas:			
Brownwood	3,300†	.55‡	....
Longview	1,000†	.60	No
Temple	3	..	Yes
Waxahachie	20,000*	..	No
Utah:			
Tooele City.....	18,660†	.09	Yes
Vermont:			
Montpelier	0.7	..	No
St. Johnsbury.....	2½†	..	No
Washington:			
Bellingham	10,000*	.42	No
Olympia	3,000*†	.90	No
Wisconsin:			
Green Bay.....	1,000	1.50‡	No
Janesville	3†	..	....
Manitowoc.....	9,000*	.40-.80	Yes
New London.....	2,455†	.30	No
Waupaca	1½	23.60‡	....
Wyoming:			
Cheyenne	12,000†	.10	No

*Work done by contract; †by municipality; ‡price includes grading; §includes all work; ¶chert; **mixed with 15% of clay, harrowed, rolled and sprinkled; †price per cubic yard; ‡cost per mile.

BITULITHIC PAVEMENTS.

City and State.	Yds. Laid in 1917.	Av. Cost per sq. yd.	Base— Kind. Thickness.
Arizona:			
Phoenix	42,067*	\$1.80‡	A. C. 3½
California:			
Bakersfield	14,173*	1.37‡	Conc. 4
Berkeley	50,000*	1.53‡	Conc. 5-6
Long Beach.....	4.8*	1.26‡	Conc. 4
Los Angeles.....	137,304*	1.35‡-1.68‡	Conc. & bit. 4, 5 & 6
Marysville	31,888*	1.44‡	A. C. 3
Richmond	37,165*	1.71‡	Conc. 5
Stockton	277,700*	....	....
Connecticut:			
Ansonia	14,000	2.39‡	Conc. 6
Idaho:			
Moscow	9,280*	2.08‡	Rock
Pocatello	21,000	2.00‡	Stn or Con. 4 or 6
Iowa:			
Ames	13,539*	1.89½‡	Conc. 5
Davenport	3,319*	1.60	....
Dubuque	7,824*	1.55‡	Mac. 4
Emmetsburg	30,000	1.89‡	Conc. 4
Grinnell City.....	114,119*	1.93‡	Conc. 5
Muscatine	5,439†	1.83‡	Conc. 5
Kansas:			
Rosedale	12,095*	2.08‡	Conc. 4
Kentucky:			
Paducah	27,423	2.21‡	Conc. 6
Louisiana:			
New Orleans.....	34,000*	1.50	Conc. 6
Maine:			
Lewiston	10,000†	..	....
Massachusetts:			
Cambridge	6,957†	1.75‡	Old Mac. base
Northampton	6,880*	1.27	Mac. & Conc. ..
Minnesota:			
St. Cloud	33,340*	2.22‡	Conc. 5
Virginia	21,994*	2.60‡	Conc. 6
Missouri:			
Joplin	15,420*	2.00‡	Conc. 6
Montana:			
Billings	45,777*	2.14‡	Conc. 5
Bozeman	20,000*	1.97‡	Rock 4
Great Falls	17,785*	2.54‡	Conc. 4
Miles City	30,000*	2.30‡	Conc. 5
Nebraska:			
Columbus	98,547	1.94½‡	Conc. 5
New Hampshire:			
Franklin	15,000*	{ 2.31‡ 1.58‡ }	Conc. } Mac. }
New Jersey:			
Irvington	48,000	2.40‡	Conc. 6
Newark	58,543*	2.52‡	Conc. 6
New York:			
Binghamton	14,208*	2.44‡	Conc. 5
Elmira	19,219	2.406‡	Conc. 5-6
Utica	33,284*	{ 2.74‡ 1.45‡ }	Conc. } Resurf. }
North Carolina:			
Salisbury	10,000*	1.85‡	Conc. 4
Winston-Salem	1,217*	2.00‡	Conc. 4
North Dakota:			
Bismarck	17,000	2.38‡	Conc. 5
Fargo	76,125*	2.13‡	Conc. 5
Wahpeton	33,626*	2.29	Conc. 5
Ohio:			
Cincinnati	17,505*	2.78‡	Conc. 6
Cleveland	48,916*	2.43‡	Conc. 6
Lakewood	2,846*	1.30‡	Conc. 6
St. Bernard	24,870	1.90‡	Conc. 6
Pennsylvania:			
Pittsburgh	11,720*	1.85‡	....
Rhode Island:			
Providence	28,144*	{ 1.76 2.28‡ }	Resurf. } Stone }
South Dakota:			
Madison	13,500*	2.15‡	Conc. 5

BITULITHIC PAVEMENTS (Continued).

City and State.	Yds. Laid in 1917.	Av. Cost per sq. yd.	Base— Kind. Thickness.
Texas:			
Austin	40,045*	2.068†	Conc. 5
Corpus Christi....	21,822*	1.75†	Conc. 4
Paris	5,383*	2.48†	Conc. 5
Utah:			
Salt Lake City.....	26,005*	1.95†	Conc. 4
Washington:			
Spokane	42,000*	2.35†	Conc. 5
Tacoma	27,721*	1.23	Bit. Mac. 4
Walla Walla.....	3,984*	1.75	None ..
Yakima	10,713*	1.23	Crushed rock 5
West Virginia:			
Piedmont	14,256	2.25	Conc. 4
	2,307*	1.65†	
	11,735*	1.70†	Crushed stone 4

*By contract; †includes grading; ‡includes base. Cost of base per sq. yd.: Davenport, Ia., 70 cts.; New Orleans, La., \$1.15; Northampton, Mass., \$1.25; Lakewood, O., \$1.15 to \$1.23; St. Bernard, O., \$1.08; Salt Lake City, 44 cts.; Tacoma, Wash., \$1.00.

OTHER THAN MUNICIPAL REPORTS.

In addition to the data furnished by city officials, we have received figures of amounts of several kinds of pavement laid in a number of cities, which figures are given below, together with the names of those furnishing them.

SHEET ASPHALT.

Information Furnished by the Barber Asphalt Paving Co.

	Square yards		Square yards
Connecticut		North Carolina	
Hartford	31,445	Burlington	46,000
New Haven	44,072	Durham	50,000
Illinois		Monroe	32,000
Evanston	4,120	Ohio	
Jacksonville	15,506	Cincinnati	7,400
Indiana		Columbus	43,480
Elkhart	8,290	Lorain	21,000
Evansville	27,724	Marion	25,901
Indianapolis	33,546	Newark	11,100
Lafayette	16,910	Toledo	27,268
South Bend	50,531	Washington Court H. ..	10,710
Vincennes	43,600	Oklahoma	
Iowa		Oklahoma City	19,475
Des Moines	48,084	State Highway	6,360
Laurens	13,000	Tulsa	10,260
Mason City	52,890	Ontario	
Rock Rapids	30,000	Lindsay	9,000
Waterloo	68,864	Ottawa	19,170
Kansas		Pennsylvania	
Wichita	26,952	Johnstown	3,150
Kentucky		Williamsport	42,000
Danville	5,683	York	9,426
Louisville	11,140	South Dakota	
Michigan		Madison	20,000
Niles	6,426	Tennessee	
Missouri		Knoxville	59,040
Kansas City	1,146	Maryville	40,000
St. Joseph	29,060	Texas	
St. Louis	18,485	Corsicana	18,000
Nebraska		Dallas	1,188
Central City	30,570	Virginia	
Grand Island	75,600	Franklin	4,000
New Jersey		Wisconsin	
Trenton	39,270	Green Bay	2,830
New York		Madison	47,006
Buffalo	79,087	Menasha	15,600
Rochester	810	Milwaukee	208,975
Utica	7,200	Oconto	13,000
		Racine	15,558
		West Allis	11,500

ASPHALTIC CONCRETE.

Information Furnished by the Barber Asphalt Paving Co.

	Square yards		Square yards
Illinois		Ohio	
Cicero	41,024	Akron	20,000
Joliet	37,470	Columbus	27,160
Kewanee	28,165	Kent	9,000
Springfield	9,550	Sidney	52,462
Iowa		Oklahoma	
Waterloo	31,750	Oklahoma City	17,850
Kansas		Sapulpa	27,142
Eldorado	21,000	Ontario	
Lawrence	24,000	Galt	12,700
Mississippi		Woodstock	4,500
Clarksdale	33,000	Pennsylvania	
Missouri		Chester	55,850
Kansas City	7,609	Edgeworth	14,000
St. Joseph	2,800	South Dakota	
Nebraska		Huron	31,241
Beatrice	9,400	Texas	
New Hampshire		Amarillo	12,000
Claremont	8,000	Hereford	26,000
New York		Virginia	
Poughkeepsie	25,000	Richmond	12,000
Tarrytown	53,000	West Virginia	
		Charleston	1,400
		Wisconsin	
		Portage	32,600
		Racine	14,663

WARRENITE.

Information Furnished by Warren Bros.

	Square yards		Square yards
Arkansas		New York	
Little Rock	48,016	Hempstead	4,255
California		Islip	3,607
San Pedro	2,305	Southampton	25,148
Whittier	28,142	Ontario	
Connecticut		Kingston	2,800
Bridgeport	376,772	New Hampshire	
Danbury	8,673	Manchester	16,227
New Canaan	16,156	West Virginia	
Southington	7,384	Edgewood	2,125
Winchester	9,151	BITUSTONE.	
Massachusetts		Arizona	
Amesbury	17,253	Tucson	2,081
Marion	9,768	Iowa	
No. Easton	2,990	Iowa City	3,960
New Brunswick		Nova Scotia	
Moncton	8,786	New Glasgow	5,377
New Jersey		Tennessee	
Asbury Park	13,488	Nashville	6,215
Kearny	2,087	Texas	
New Brunswick	20,088	Austin	1,639
Perth Amboy	6,641	ENDURITE.	
Princeton	6,700	Massachusetts	
Ridgewood	28,275	New Bedford	45,465
So. Orange	1,198		

BITULITHIC PAVEMENT.

Information furnished by Warren Bros. Co.

	Sq. yds.		Sq. yds.
Arizona:		New York:	
Ajo	6,810	Cooperstown	10,800
Tucson	34,473	Endicott	7,560
Yuma	20,594	Frankfort	23,334
Arkansas:		Johnson City	2,146
Little Rock	4,376	Mohawk	1,107
California:		New Rochelle	11,806
Albany	11,279	*Mohawk	11,135
Calexico	28,020	*Utica	9,308
Fresno	33,697	*Camden	14,042
Mill Valley	56,376	Rochester	7,136
Modesto	16,980	Rome	11,724
Redding	16,805	Troy	5,310
San Francisco	5,865	Yonkers	33,578
San Pedro	45,925	*Partly by New York State Highway Dept.	
San Joaquin	12,595	North Carolina:	
Turlock	8,952	Albemarle	12,407
Woodland	27,794	Lenoir	6,740
Connecticut:		Rocky Mount	15,756
So. Norwalk	6,106	Wilson	22,212
Florida:		Ohio:	
Jacksonville	20,302	Bexley	6,328
Idaho:		Canton	478
Idaho Falls	10,889	Hudson	3,170
Rexburg	31,000	Oregon:	
Wallace	51,116	Astoria	15,689
Iowa:		Pendleton	24,175
Grundy Centre	44,149	Portland	40,060
Des Moines	140,007	Pennsylvania:	
Muscatine	4,080	Altoona	10,767
Valley Junction	37,842	So. Bethlehem	17,646
Kansas:		Rhode Island:	
Kansas City	24,417	Manville	1,326
Massachusetts:		Tennessee:	
Boston	3,474	Nashville	13,775
Brookline	1,264	Texas:	
Dedham	3,330	Dallas	55,318
Fall River	17,373	El Paso	254,197
W. Newton	340	Ft. Worth	408
Minnesota:		Galveston	17,535
Buhl	14,487	Waco	24,932
Michigan:		Washington:	
Escanaba	21,432	Camas	32,086
Missouri:		Sprague	14,808
St. Louis	22,684	Sunnyside	28,778
Montana:		N. Yakima	2,455
Butte	30,007	Wapato	898
Missoula	1,100	Woodburn	7,910
Roundup	22,425	Wisconsin:	
New Hampshire:		Elkhorn	11,464
Portsmouth	3,312	Waupun	45,879
New Jersey:		Wyoming:	
Kearny	3,862	Casper	28,376
		Sheridan	24,260

ASPHALT MACADAM.

Information Furnished by the Barber Asphalt Paving Co.

	Square yards		Square yards
New York		Oklahoma	
Little Falls	2,300	Durant	12,240
Manhasset, L. I.	6,500	Pennsylvania	
North Hempstead, L. I. ..	8,350	Birdsboro	16,000
Oyster Bay, L. I.	12,000	Texas	
St. Johnsville	12,000	Terrell	20,587
Ohio		Virginia	
Hamilton	15,215	Chase City	11,000

(Continued on page 148.)

Municipal Journal

Published weekly at
243 West 39th Street
by

Municipal Journal and Engineer, Inc.

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Sec'y.

A. PRESCOTT FOLWELL, Editor
W. A. HARDENBERGH and SIMON BARR, Assistant Editors
CHARLES CARROLL BROWN, Western Editorial Representative

Telephone, 0591 Bryant, New York
Western Office, Monadnock Block, Chicago

Subscription Rates.

United States and possessions, Mexico and Cuba.....\$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at
New York, N. Y., under the Act of Congress of March 3, 1879.

Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

PAVING DONE BY CITIES IN 1917.

In this issue we publish our annual review of city paving done during the year 1917, together with information concerning certain features of the work, such as character of foundation, kind of filler, use of expansion joints, cost, etc. The number of cities reporting is smaller than in normal times, but it seems probable that the percentage which the work reported is of all that was done is about the same as in previous years, or about two-thirds.

As we have stated in connection with previous annual statistics, there never has been a complete statement of all municipal paving and we question whether such a statement will ever be possible. The federal government has no power to require city officials to report figures of this kind. Those received by us were furnished only by the courtesy and kindness of the city officials. We wish to assure those who have furnished us these data that we deeply appreciate their courtesy, and feel confident that the thousands who will refer to the tables in which they are set forth will add their thanks to ours.

Of the many cities that are not represented in the tables, most, we believe, did little or no paving work last year. Several officials apologized for not sending data, explaining that the amount done was so small that they did not wish to have it made public, while several score reported that no work at all was done last year.

Without attempting to make an exact comparison city by city, the general totals seem to indicate that the amount of city paving done during 1917 was about two-thirds as great as in 1916. The decrease was greater with some classes of pavements than with others, but there seem to be no striking changes in the relative popularity of the several kinds, nor any new radical developments

in paving practice that have found their way into general use.

Even more interesting, probably, than the yardage laid, are the descriptions of certain details of construction, such as thickness, proportioning of materials, use of reinforcement and of expansion joints in concrete pavements, thickness of base and kind of filler used for block pavements, and other features. In order to give to the cost figures as much value as possible, we have given as much information as seemed practicable and obtainable concerning just what was included in each case in calculating cost—whether base, excavation, curbs, etc., were or were not so included.

PAVING WORK FOR 1918.

The question which is perhaps interesting those having charge of street and highway paving more than any other at the present time is the extent to which they are justified in endeavoring to carry on pavement construction during the year 1918, in view of the duty of all patriotic citizens to conserve material, labor and money, and also in view of the high prices which all of these will undoubtedly bring this year. As described in our account of the convention of the American Road Builders' Association, this subject is one that occupied much of the time and interest of the convention and was discussed more or less at length in a number of the papers read. One of these, especially, of which quite an extensive abstract is given in this issue, was devoted to an effort to answer the first of these questions, viz.: to what extent public officials would be justified by war conditions in carrying out pavement construction?

We believe that there is no tendency to dispute, either in Washington or elsewhere, the general proposition that there is urgent need for first class hard-surface pavement on all highways which will aid any traffic that is essential or helpful to the conduct of the war. The difficulty lies in deciding for each particular case whether it comes in this category, and which of the many highways under consideration are deserving first consideration from this point of view.

It was suggested by one speaker on this subject that each official, whether city, county or state, who has charge of highway construction, make a list of all highways the paving of which is being considered, arranging them in the order of priority, based entirely upon the consideration of the value of such paving to the prosecution of the war. This having been done, a list of those considered most desirable, arranged in order of priority and accompanied by the reasons for the classification, would be submitted to the Highways Transport Committee or such federal authorities as early future Congressional action may authorize to pass upon such questions, which could then compare the lists submitted by the several cities, counties or states, and make such selection as would secure for the country at large the construction of those highways which would best serve the purpose which all now have foremost in mind.

The fear that was more or less prominent a few weeks ago, that those having charge of the transportation or finances of the country would discourage if not practically prevent any highway construction this year, has been found to be unjustified. This should not be held, however, to warrant spending of funds for construction which serves no immediately useful purpose. For instance, one of the large cities of the country recently issued bonds for extensive construction work in connection with sewers, water works, streets and parks. A few days ago it was brought to the attention of the city authorities that it was the opinion at Washington that,

while the expenditures for sewers, water works and streets were apparently warranted by the necessities of their citizens, the park work which was contemplated could be postponed until after the war without any serious detriment to anyone, and the bonds which had been issued for this purpose were recalled.

As in the case of many of the various lines of self-denial which the American people are asked to make this year, it is left largely to the patriotism of each to decide whether or not a given line of conduct will aid or hinder the country in its war program, and we believe that officials of cities and other political units who have charge of preparing highway programs can be relied upon to do so with the idea of war utility ever dominant and to use in this work that true economy which knows how and where to spend money as well as where to save it.

SOME NEW IDEAS IN CONCRETE.

On February 8th, in a lecture before a party of state highway engineers and others interested, Prof. Duff A. Abrams of Lewis Institute discussed the theories of concrete and advanced some new ideas differing more or less from those commonly entertained. He described a method of measuring the relative size and grading of any aggregate by a function called the "fineness modulus." This modulus gives a new method of proportioning concrete which is simple and at the same time entirely scientific. By the present method of proportioning, exactly the same quantity of cement may produce a concrete in one case which is only fifty per cent as strong as could have been produced by the same amount of cement with a rational proportioning of the same aggregates. He would indicate concrete mixtures by a single ratio of cement to combined aggregate, the aggregates available to be mixed in proportions that will give the best results; for example, a 1:4 concrete instead of 1:2:3 or 1:1½:3. He considers it erroneous to fix the proportions of fine and coarse aggregate in advance and then attempt to make grading of the materials such as will give the proper combination when mixed in predetermined proportions. The proper method would be to study the characteristics of the aggregates available and then mix the fine and coarse together in those proportions which will give the best results, considering the quantity of cement to be used and the character of the work. The size and grading of sand he considers less important than is usually supposed. Many sands rejected under the present specifications would, if properly proportioned, give better concrete than is generally obtained from materials acceptable under present specifications and proportioned according to current methods. The "fineness modulus" of proportioning permits of obtaining the best results of which available materials are capable.

The detrimental effect of too much water is not generally appreciated. Failure to properly proportion water is the origin of many of the erroneous conclusions reported from concrete tests. The proper proportioning of water is of especial importance in experimental work, particularly when comparing different aggregates. Probably the most significant result from the experimental work of the Structural Materials Research Laboratory of the Lewis Institute is indicated by the conclusion that "the only advantage gained from using a coarse, well-graded aggregate is due to the fact that the concrete can be mixed with less water than is required by a finer aggregate."

Another idea advanced by Prof. Abrams is that "the accepted theory that concrete aggregate should be graded in such a way as to give minimum voids is entirely errone-

ous." On the other hand, the maximum strength of concrete is secured with a grading that gives a much higher percentage of voids than that corresponding to the maximum density for a given maximum size of aggregate. If the maximum size of the aggregate is increased, using a sieve analysis curve of the same form, then the strength of the concrete increases as the voids are reduced.

WAR CONFERENCE OF NEW YORK CITIES.

A call for a war conference on March 6th of officials of New York State cities and of the state has been sent out by the president of the New York State Conference of Mayors and Other City Officials, Cornelius F. Burns, mayor of Troy. The mayor, the corporation council or city attorney, head of the Department of Public Safety, city engineer, and chairman of the Local Home Defense Committee of each city are requested to attend; while among the state officials invited are Gov. Whitman, Adj. Gen. Sherrill, John Mitchell, chairman of the State Food Control Commission, state food administrator Wiggins, state highway commissioner Duffey, state health commissioner Biggs, and W. H. Knapp, chairman of the State Tax Department.

Mayor Burns outlines the purposes of the conference as follows:

"First—To learn from the state officials in what ways the city governments may and should co-operate with the state government on war problems and activities, including the equipment, care and comfort of the state's armed forces, home defense, municipal improvements, the production, conservation and control of food and fuel, the financing of new municipal activities due to the war and the conservation of public health. Second—To acquaint the state with the needs of the cities in helping to carry out the State's program. Third—To give to the new officials of the twenty-five cities which changed administrations on January 1, and to the old officials, an opportunity to meet and learn how the other cities are handling various war problems. Fourth—To acquaint the new city officials with municipal war activities."

OTHER THAN MUNICIPAL REPORTS.

(Continued from page 146)

ASPHALT BLOCK PAVEMENTS.

Information Furnished by the Hastings Paving Co.

	Square yards		Square yards
New Jersey			
East Orange	6,126	Port Chester	7,001
Irvington	7,450	Rochester	3,300
Jersey City	38,150	Yonkers	20,289
Newark	6,084	Ohio	
Orange	8,575	Cleveland	16,994
South Orange	9,235	Defiance	13,036
South River	19,560	Fostoria	2,972
West New York.....	10,539	Toledo	12,307
Woodbridge	30,932	Pennsylvania	
New York			
Amsterdam	34,483	Dorrancton	2,967
Bronxville	17,520	Fernwood	1,170
Irvington	42,744	Hazleton	2,650
Jamestown	1,760	Hughestown	3,790
Middletown	1,600	Hulton	2,344
New York:		Kingston	4,472
Bronx Boro.	11,344	Nanticoke	9,891
Brooklyn Boro.	28,321	Newport Township ...	9,059
Manhattan Boro.	6,454	Olyphant	5,004
Queens Boro.	12,863	Peckville	3,550
Richmond Boro.	2,919	West Wyoming	11,811
Plattsburg	2,810	District of Columbia	
		Washington	23,172

GRANITE BLOCK PAVEMENT.

Information furnished by the Granite Paving Block Manufacturers' Association.

Maryland:		Taunton		8,000
Baltimore	12,000	Ohio:		
Massachusetts:		Columbus	4,700	
Boston	60,000	Dayton	29,119	
Chicopee	11,134	Vermont:		
Salem	14,000	Barre	7,250	

The WEEK'S NEWS

State Highway Construction in Tennessee and Indiana—The Work of the United States Public Health Service—Milk Control in Massachusetts—Wanaque in Court Again—Water Waste Survey in Niagara Falls—No Free Utility Service in Indiana—Wage Raises for Firemen in Newark and Galveston—\$25,000,000 Bond and Note Sale by New York City—City Manager Events in Morganton, N. C.; Beaufort, S. C.; Norwood, Mass.; Kalamazoo, Mich., and Aberdeen, Wash.—State Control of Local Traffic Regulations—San Francisco's Twin Peaks Tunnel Opened—The St. Louis Car Strike.

ROADS AND PAVEMENTS

\$1,500,000 for Tennessee Road Building.

Nashville, Tenn.—The appropriations made recently by the Tennessee highway commission of approximately \$1,500,000 to be used in co-operation with the counties is expected to enable the commission to complete the missing links and open for all-the-year-round travel approximately 1,400 miles of through highways of national importance and at the same time provide the first of the main artery highways comprised in the state's system of highways. In addition to the appropriations, the laws passed last year guarantee an amount of not less than \$25,000 to be expended in each of the other counties of the state, the money to be expended when available, but to be contracted for some time prior to December, 1921, so that every county in Tennessee will within the period mentioned receive aid from the state in the construction of state highways. The proposed system includes:

The Memphis-to-Bristol highway opens the highway across the state from northeast to southwest and connects at Bristol with a Virginia state highway leading to Washington and the east. At Memphis it connects with the Jeff Davis highway leading to New Orleans and with the Arkansas state highway leading to the west and southwest. It also connects Bristol, Knoxville, Nashville, Jackson and Memphis with the counties intervening, having a connection with each of these centers. It also provides a through road accessible to the counties adjoining.

The Dixie highway crosses the state from the northwest to the southeast, connecting Nashville and Chattanooga and the military camps in the north and with those in the south-east, and is considered of vast military importance. It also passes through a rich agricultural section and the federal authorities are already planning truck trains on this highway to market farm products.

The Chattanooga-Bristol highway forms a direct line from Washington to Birmingham and New Orleans and connects at Knoxville with the Memphis-to-Bristol and at Chattanooga with the Dixie highways. At Newport it connects with the Knoxville-Asheville highway. At Knoxville it connects with the eastern branch of the Dixie leading to Louisville and the north.

The Jeff Davis highway connects Chicago, Paducah, Memphis and New Orleans with a direct road down the Mississippi river and opens up a rich farm section.

State Highway Commission Attacked in Suit.

Indianapolis, Ind.—A suit to have declared unconstitutional the act of the legislature which created the state highway commission has been filed in court in Noblesville. Robert M. House, a wealthy farmer, appears as plaintiff in the case, and Lorenzo H. Wright, David C. Jenkins, Haines Egbert and Lewis Taylor, who compose the state highway commission; William S. Moore, engineer for the commission; Otto L. Klauss, state auditor; Uz McMurtrie, state treasurer; H. O. Cottingham, county auditor; the local board of commissioners and the Hamilton county council are made defendants. The complaint also asks for a temporary restraining order against the defendants, and is a step to prohibit them from proceeding with the construction of any of the state roads now under contemplation until the case finally is determined. It is set out in the complaint that the act of the legislature in question contravenes the constitution of the state of Indiana and the constitution of the United States, and is unconstitutional and void. It is alleged that the pretended allotment of mileage for these proposed roads is wrong, unlawful, illusory, false and misleading for the reason that it is partial and incomplete. It further is charged that the commission has prepared plans for the construction of these roads at a rate of expense of from \$2,500 to \$3,000 a mile,

"all to the end that said pretended apportionment may be aggregated and made cumulative and applicable only to so

many miles as may and can be constructed, with the total of said apportionment at the rate of \$25,000 a mile, plus an equal amount to be contributed by each of the counties affected, and particularly Hamilton county; that in Hamilton county the mileage of said affected road No. 1 is in truth and in fact twenty miles, but the apportionment therefor is at the rate of \$2,500 a mile for eighteen miles, and in the aggregate the said apportionment of moneys belonging to the treasury of the state is \$45,000; that this aggregate, together with a like aggregate to be contributed by Hamilton county, the two sums being a total of \$90,000, is wrongfully and unlawfully to be devoted by said pretended state highway commission in carrying out the aforesaid unlawful purpose and common design of the defendants in the construction of a road extending from the Marion county line north to the town of Carmel."

Warning Signs Not Enough to Make Bridges Safe.

Utica, N. Y.—An important decision from the Appellate Division has been filed which affirms the decision made by the Court of Claims in the case of an Italian driver against the state for damages. He received an award of \$600 for damages sustained when a wagon loaded with gravel which he was driving went through a bridge at Stacy Basin. The load of gravel weighed four and one-half tons and there was a sign on the bridge warning against driving over the bridge with loads in excess of two and one-half tons. The decision stated that the sign and its warning did not free the state from liability, and it was up to the state to make the bridge safe for any ordinary loads and all traffic. The driver had no choice, as there was no other bridge and he was compelled to use the bridge or lose his job.

Two States Buy Bridge.

Trenton, N. J.—New Jersey and Pennsylvania have the consent of the New Jersey public utility commission to purchase the Bridge Street (or lower Trenton) bridge of the Pennsylvania Railroad Company for \$236,400. This is considered an important step in the work of the joint free bridge commission of the two states in freeing this bridge from toll. Application for approval of the negotiations for the sale of the bridge to the states was made by the Trenton Delaware Bridge Company on behalf of the Pennsylvania Railroad Company, and by John A. Campbell, president of the New Jersey Free Bridge Commission and vice-president of the joint free bridge commission of the two states. Approval of sale of the bridge carries with it approval of sale of the land that is owned by the railroad company and used as approaches to the bridge. It also carries the ferry rights in the river at this point, bought by the railroad company in 1808. The Pennsylvania utility commission has also issued its approval of the sale. The price to be paid for the bridge and approaches was fixed by the joint free bridge commission under an offer made by the Pennsylvania Railroad Company more than a year ago to sell the bridge to the states for a price to be fixed by the engineers of the joint commission.

Americans to Build Model Roads in China.

Peking, China.—At a conference held recently between the representatives in this city of the Rockefeller Foundation and the Chinese director-general of flood relief and conservancy, final arrangements were completed for the building of the proposed model highway from Peking to Tungchow. Tungchow is an important provincial town about 15 miles east of Peking. It is a great center for missionary work, and several important educational institutions are located there. The scheme of a road from Peking has been under discussion for some time, and its adoption in a practicable form at present is due to the urgent need of finding employment at this season of the

year for some of the persons left destitute by the serious floods in the Province of Chirli last fall. The American Red Cross has already deposited \$100,000 in a Peking bank to cover the cost of this work, and the Chinese Government has promised to deposit an equal amount shortly. A Chinese director of the work has been appointed and another Chinese—formerly technical expert of the ministry of the interior—has been made chief engineer; but close attention to the matter will be given by an American engineer, who will probably be one of those employed by the American company that is now engaged in railroad building in China. It is proposed to extend this road to Tien-tsin when additional funds are available.

SEWERAGE AND SANITATION

United States Health Service Organizes District.

Portsmouth, Va.—Approving the plan proposed by the United States Public Health Service to establish a health district here, comprised of Norfolk county and Portsmouth, the board of supervisors of the county have made an appropriation of \$2,700 to carry into effect the district plan by financing the county's share until the end of the current fiscal year, June 30. Dr. George M. Converse, of the health service, who was here for several weeks working on the health district plan, addressed the board on the subject, outlining some of the details of the work, and pointing to the problems of health which are confronting this section by reason of the greatly enlarged governmental activities, and the growth in population by the influx of people from all over the country, attracted here by federal construction projects. Dr. Converse gave a general outline of what it is proposed to do to bring about the co-operation and development of the health administration of the city and county. He referred to the appearance of cerebro-spinal meningitis, and also pointed to the typhoid situation, which he declared will have to be confronted when the warm weather arrives. Mosquito work must also be undertaken here as a malaria preventive, he said.

State Wins Case on Milk Standards Control.

Boston, Mass.—The supreme court of this state recently rendered a decision favorable to the government in the case of Commonwealth v. Titcomb. This was a complaint made by the Boston health department, through the agency of the milk bureau, and charged the defendant with possession with intent to sell of milk not of good standard quality. The defendant was not a producer of milk, and contended that the milk law was unconstitutional, as it did not allow him any time to bring his milk up to standard quality, as is the case with milk producers in accordance with the law. According to this law section producers of milk are allowed twenty days to bring their milk up to the legal standard after the taking of a sample which fails to conform to the requirements of the law for milk solids and fat. After the twenty-day period, if the producer's milk is still below the legal standard, prosecution may be made. In discussing this contention of the defendant the court said in part: "This statute is assailed as being arbitrarily discriminatory in favor of the producer of milk against the seller who is not a producer, and as making an unfair and unreasonable classification, and as being violative of rights secured by the Constitution of the United States. So far as the federal constitution is concerned these contentions of the defendant seem to be disposed of adversely by the decision of *St. John v. New York*, 201 U. S. 633. In the statute of New York there under consideration it was said:

"If we could look no farther than the mere act of selling, the injustice of the law might be demonstrated, but something more must be considered. Not only the final purpose of the law must be considered, but the means of its administration—the ways it may be defeated. Legislation to be practical and efficient must regard this special purpose as well as the ultimate purpose. The ultimate purpose is that wholesome milk shall reach the consumer, and it is the conception of the law that milk below a certain strength is not wholesome, but a difference is made between milk naturally deficient and milk made so by dilution. It is not for us to say that this is not a proper difference, and regarding it the law fixes its standard by milk in the condition that it comes from

the herd. It is certain that if milk starts pure from the producer it will reach the consumer pure if not tampered with on the way. To prevent such tampering the law is framed and its penalties adjusted. As the standard established can be proved in the hands of a producing vendor, he is exempt from the penalty; as it cannot certainly be proved in the hands of other vendors so as to prevent evasions of the law, such vendors are not exempt. In the one case the source of milk can be known and the tests of the statute applied; in the other case this would be impossible except in few instances."

"The statute is not in contravention of any provision of the constitution of this commonwealth. The statute is designed to protect and promote the public health. Under present conditions of life milk is an essential article of food in almost universal use. Any statute rationally adapted to the end of securing its purity, preserving unimpaired its natural qualities and securing it from adulteration plainly is within the power of the legislature. It was said in *Commonwealth v. Graustein & Co.*, 209 Massachusetts, 38, 42, that 'the history of milk legislation in this commonwealth shows conclusively the determination of the law-making power to protect the community from adulterated or impure milk.' The intent of the vendor has been made immaterial, the main object being to shield the public from an imposition in guise of a fluid which may look like pure milk and yet be either adulterated or skimmed, an imposition difficult of detection. Necessarily there must exist a wide distinction in the selection of appropriate means. . . . A classification of vendors of milk into those who are producers and those who are not cannot be said to rest upon an immaterial, unreasonable, or arbitrary distinction. The legislature has ample power under the constitution to enact statutes regulating conduct, based upon classifications which have some rational connection with the preservation of the public health. It may exclude some from their operation so long as such exclusion has a reasonable relation to the result to be achieved, and is not a whimsical or arbitrary selection."

Health Campaign in Extra-Cantonment Areas.

Washington, D. C.—The United States Public Health Service is at present carrying on an active campaign along sanitary lines in the areas adjacent to 28 military camps and cantonments throughout the country. Complete sanitary organizations, composed of personnel supplied by the Public Health Service, the American Red Cross, and state and local health authorities, are at work in these areas for the purpose of preventing the spread of disease from the civilian population to military forces, and to protect the civil populations from communicable diseases where they have occurred among troops. The sanitary organizations include physicians, sanitary engineers, sanitary inspectors, public-health nurses, attendants and laborers. Measures undertaken include medical inspection of school children, inspection of all establishments handling food supplies, inspection of barber shops, purification of unsafe or questionable water supplies, installation of sanitary methods for the disposal of waste and drainage or filling of mosquito-breeding places. There is engaged in this work a force of approximately 440 employees of the Public Health Service, comprising 50 commissioned officers, 50 acting assistant surgeons (noncommissioned medical officers), 65 scientific and technical assistants and 75 other persons, including public-health nurses, sanitary inspectors, clerks, stenographers, laborers, etc. The Red Cross has furnished 177 scientific and technical assistants, nurses, inspectors, etc., and over 200 laborers to assist in the campaign.

National Campaign to Save 100,000 Babies.

Washington, D. C.—The country is going to celebrate the first anniversary of its entry into the war by inaugurating a "Children's Year" on April 6. The object is the saving of 100,000 lives ordinarily sacrificed to infant diseases. The plans have been announced by Miss Julia C. Lathrop, head of the Children's Bureau of the federal government. A nation-wide weighing and measurement of babies and children of pre-school age will begin April 6, to be followed up by an educational campaign, which, it is hoped, will diminish at least one-third the annual total of 300,000 preventable deaths of children of five years of age. The physical examinations will be the most compre-

hensive stock-taking of human resources ever attempted for the purpose of conserving human life. Co-operation in the work is promised by the women's committee of the council of national defense, headed by Dr. Anna Howard Shaw, and by the various state councils and women's organizations. The actual methods by which lives are to be saved during the twelve months' period are those whose effectiveness in saving children's lives already have been demonstrated. Briefly, they are as follows: First, immediate registration of every child born and nursing so that medical skill may be provided wherever family income does not permit its being obtained independently; second, for every mother prenatal care, necessary care of doctor and public health nurses at confinement and after care; third, children's conferences where well babies can be taken periodically to be weighed and examined, and clinics where sick children may be given medical advice; fourth, organization of state and city divisions or bureaus of child hygiene; fifth, guarding of the milk supply; sixth, an income making possible decent living standards. Each state will be assigned a quota to the extent to which it will be expected to reduce its mortality total during the children's year.

WATER SUPPLY

Court Upholds State Power on Wanaque Development.

Trenton, N. J.—The authority of the State Department of Conservation and Development to attach reasonable terms and conditions to the consent given the North Jersey District Water Supply Commission to develop the Wanaque watershed has been upheld by the Court of Errors and Appeals. The decision was an affirmation of the conclusions reached by the Supreme Court in dismissing the certiorari proceedings brought by the Society for Establishing Useful Manufactures against the Department of Conservation, the North Jersey Water Supply Commission and the city of Newark. The affirmance by the Court of Errors was based upon the opinion filed for the Supreme Court by Justice Black, September 14 last.

Newark, N. J.—The decision reached by the Errors Court caused gratification among city officials in Newark. The effect of the decision is to remove the legal barrier that has hitherto existed to the actual execution of a contract between the city and water commission for the development of the Wanaque. As matters stood prior to the rendering of this decision, the city could go only up to the point of making a contract, permission to proceed so far having been obtained from the court. However, the city commission is not yet ready to say whether it desires to proceed with negotiations leading up to the making of a contract, and is still deliberating on that point. Speculation on the part of city officials now turns to what will be the next step of the S. U. M. to prevent the Wanaque development. It has been rumored that the society would not rest satisfied with the opinion of New Jersey's highest court, but would appeal to the United States Supreme Court. On the other hand, it is pointed out, the society and its allied interests might wait until the city should enter into a contract with the water commission before starting any further litigation.

Leak Survey Saves 100,000,000 Gallons a Year.

Niagara Falls, N. Y.—The recent pitometer survey of leaky water mains has resulted in finding means to save the city more than 100,000,000 gallons this year, according to a report by city manager Carr. "Upon the completion of their survey two large meters which were running slow were called to our attention, two leaks in outside service connections, together with leaky services, which leaky connections alone, in their estimation, amounted to a loss of 102,200,000 gallons of water per year. Since that time, the meters have been corrected by the manufacturers, having been found to be running slow, one 13 per cent and the other 22 per cent. Yearly loss in water by meter 13 per cent slow—3,693,688 gallons. Yearly loss in water by meter 22 per cent slow—18,186,688 gallons. Loss in water through first service leak repaired—estimate 9,855,000 gallons. Loss

in water through second service leak repaired—estimate 10,512,000. Total, 42,246,932 gallons. From the above it seems that the 331-3 million gallons per year which this company guaranteed to save the city has been exceeded. In addition, the leaky connections have been repaired and we are endeavoring to have the owners of property in this district entirely eliminate hopper closets and other wasteful water fixtures."

Town Takes Over Abandoned Water Plant.

Valley Park, Mo.—The town of Valley Park has begun operating "somebody's water plant" to supply the inhabitants with water, but it does not know whose plant. For several weeks the townspeople have had to carry water from the Meramec River or melt ice and snow for their needs. The water plant formerly was owned by the Valley Park Plate Glass Co., and later passed to the Missouri Plate Glass Co. When the latter went into bankruptcy last October, the receiver, W. J. Vance, who also is mayor of Valley Park, continued to operate the plant. It was found, however, that the cost of operating it with the old equipment was eating up the assets of the bankrupt company and just before the company's property was sold under a mortgage federal judge Dyer issued an order to close the water plant. The city tried to purchase the water plant, but \$35,000 was asked for equipment which mayor Vance said was not worth more than \$5,000. The mayor then consulted the Public Service Commission and has received a letter from that body stating that it has given no permission for transfer of the plant, as required for sale of a public utility, since it was owned by the original Valley Park Plate Glass Co. Subsequent transfers, therefore, are invalid, the mayor says, and in view of this the city will treat the plant as "abandoned."

STREET LIGHTING AND POWER

Company Withdraws Service Charge.

Napoleon, O.—Patrons of the Ohio Gas, Light and Coke Company, of this city, have been notified that they are to be permanently relieved of a 25-cent per month readiness-to-serve-charge and refunded the 62 cents already collected. The towns affected are Napoleon, Bryan, Wauseon, Delta and Montpelier. The charge was imposed August 15, but further collections were temporarily restrained by the Fulton county court early in December. The company, in its announcement, states that it withdraws the charge rather than enter into lengthy and expensive litigation. In its stead the price of coke is to be raised.

Canada Proposes International Power Development.

Toronto, Ont.—Sir Clifford Sifton, chairman of the Canadian Conservation Commission, recently gave out the following statement regarding the power development of the St. Lawrence river: "A situation analogous to that in which Niagara power stood fifteen years ago, now exists on the St. Lawrence river. A very large development of power exists upon the St. Lawrence. There is a considerable development in the neighborhood of Montreal, but the greater portion of the power still remains undeveloped. Attempts are constantly being made to fatally complicate the position with respect to St. Lawrence power by securing the privilege of private development, which will be followed by contracts for the exportation of the power developed. I understand that the Cedar Rapids Company exports something like 60,000 h. p. per annum. An attempt was made some years ago to secure the privilege of developing the Long Sault power, the purpose being to export the greater portion of the power in the interest of a manufacturing corporation on the United States side of the line. This project was defeated largely through our efforts. A similar project is now being promoted and we are resisting it with all our energy and we trust with good prospects of success. It is almost incredible that any responsible man should be so shortsighted as to favor this project in the face of the experience which we are now undergoing at Niagara.

"The United States government is not interested in the corporations that are endeavoring to get possession of the

St. Lawrence power from the other side. Neither is the Canadian government interested in the fortunes of the gentlemen who are promoting their projects on the Canadian side. They are very few in number and their interests are confined entirely to themselves. What the United States and Canadian governments alike are interested in is that there should be a fair division of this power, that it should be developed in such a way that the neighboring and tributary population should have the use of it upon fair terms. A thorough study of the whole question inevitably leads to the conclusion that there is only one sound and satisfactory method of developing these powers, and that is by an international commission, under which the greatest and best use of the powers will be made, the most economical development will be effected, a just and equitable division of the power will take place and the governments concerned will be able to administer the power as the Hydro-Electric Power Commission administers the power of Niagara for the benefit of the people who are directly concerned in its use."

Utilities Must Abolish Free Service.

Indianapolis, Ind.—The Indiana public service commission has entered an order, denying the responsibility of the Interstate Public Service Company to continue giving free utility service of various sorts to cities and towns, wherein the company operates now under indeterminate permits from the commission. The company's former franchises from the cities and towns in question were surrendered under the provisions of the public utility act, which created the Indiana commission. The ruling is the first that has been made public on this question by the reorganized commission. The Interstate company filed petitions with the commission, asking relief from continuance of such free utility service. A recent decision from the supreme court gave the commission unquestioned authority to deny the giving of free service to a town or city, it is held, and the action just taken was in line with that decision. The towns and cities in which the free service will be discontinued follow: Monticello, Kentland, Lowell and Crown Point, all electric service; Lebanon, electric and hot water heating service; Franklin, electric, gas and water service. At Franklin, while the official designation of the utility property is the Franklin Water, Light and Power Company, the bulk of the stock of that company is owned by the Interstate Company. The commission's order held that such free service constitutes an "unjust discrimination against other consumers."

The commission has entered an order authorizing the Noblesville Heat, Light and Power Company to increase its bills for service to its patrons by the addition of a surcharge, as a wartime emergency measure of one-half cent for each kilowatt of energy furnished. The order extends to February 1, 1919. The commission has estimated that such a surcharge will bring the company about \$2,500 additional revenue during the coming year. Increased costs of operation, including the increase in the price of coal, made such an addition to the revenues necessary, the hearing of the case brought out.

English Municipal Electric Plant Grows.

Sheffield, England.—The report of the electric supply department of the Sheffield city corporation for the fiscal year ended March 25, 1917, which was recently issued, shows an extraordinary development of the undertaking during that period. The plant has been largely extended at a cost of £243,725 (\$1,186,088) making the capital account now stand at £2,100,272 (\$10,220,976), and 8,500 kilowatts of additional generating plant is still in course of construction. The number of units sold has increased 62 per cent.—from 77,868,027 to 126,476,858; the revenue has increased 62 per cent.—from £277,580 (\$1,350,843) to £450,088 (\$2,190,353); the turnover of the installation and motor department has increased 50 per cent., and during the year it has installed motors representing 8,046 horsepower. The balance on the year's operations amounted to more than £95,493, of which £55,000 was transferred to the renewals and special expenditure fund, and £40,493 to special depreciation suspense account. These increases are all the

more remarkable in view of the fact that the year ended March 25, 1916, showed large increases in every department over the preceding year. The average prices per unit charged during the past five years have ranged as follows: For light and heat, from 4.34 cents in 1916 to 5.52 cents in 1913; for power, from 1.42 cents in 1916 to 1.52 cents in 1913; total average, from 1.70 cents in 1917 to 2.42 cents in 1913. The total cost per unit sold during the year, including cost of production, management, rates, taxes, etc., and capital charges was 1.36 cents.

FIRE AND POLICE

\$55,000 Raise for Firemen.

Newark, N. J.—According to the city budget for the year 1918, the commissioners have decided to give the majority of men in the fire department wage increases totaling \$55,000 a year. The total department budget is \$1,022,000. The firemen in the several grades wanted to be paid salaries that would correspond to those of policemen of similar grades. Instead of doing this the commissioners made all the raises but one a flat \$100 a year.

The raises follow: 147 fourth grade firemen, from \$800 to \$900, total \$14,700; 318 first grade firemen, from \$1,300 to \$1,400, total \$31,800; forty-one lieutenants, from \$1,400 to \$1,500, total \$4,100; thirty-eight captains, from \$1,600 to \$1,700, total \$3,800; three first grade linemen, from \$1,300 to \$1,400, total \$300; one fourth grade lineman, from \$800 to \$1,100, total \$300; grand total, \$55,000.

Thus fourth grade firemen get the same as fourth grade policemen, first grade firemen get \$50 a year less than first grade policemen, fire lieutenants get \$250 a year less than police sergeants and fire captains get \$300 less than police lieutenants.

Fire Destroys Car Barns and Cars.

Wheeling, W. Va.—Twenty-nine cars and the west bay of the Wheeling Traction Company barns on the Wheeling Island were destroyed by an early morning fire, believed to have been incendiary. General superintendent W. B. Atwood estimated the traction company's loss at \$450,000. Eleven cars were saved from the flames. A heavy wind fanned the flames, which spread rapidly. The fire started when a car man, who was lighting a car heater with oil-soaked waste, dropped the burning mass to the floor. Traffic was paralyzed on the traction company's lines for days, but every remaining car, both modern and obsolete, was pressed into service as quickly as possible. The state fire marshal's office investigated the fire at once.

Supreme Court Upholds Anti-Vice Ordinance.

Shreveport, La.—All doubt as to the legality of the Shreveport anti-vice ordinance was removed when the Louisiana state supreme court sustained the judgment of the local police court rendered several weeks ago in a test case against two women. As to the man in the case, the lower court's decision was reversed, but the main law points, those involving the constitutionality of the anti-vice ordinance, were sustained. This decision brings to a close a brief but very strenuous legal battle, which started immediately after the city council's ordinance eliminating Shreveport's vice section went into effect November 15. That very night the alleged proprietress of a vice establishment, a young woman inmate and a man were arrested on the charge of improperly using a room. The case, it was understood from the beginning, was brought for the purpose of testing the new ordinance, which was passed in accordance with an overwhelming affirmative referendum vote of the citizens as the result of an anti-vice movement inaugurated by the Shreveport Rotary Club. On the argument of the case the defense counsel contended that the city council in adopting the anti-vice ordinance exceeded its authority as granted in the municipal charter. They claimed that the council, under certain conditions, could regulate places of vice, but could not legally abolish such places. That the council lacked the authority to abolish the vice district was the particular contention of the defense. On the other hand, the prosecution, through assistant city attorney Dimick, took the position that the law gave the city the power to close up the vice area under the general welfare law. According to this contention, a vice place is a nuisance per se, and the municipality has the right always to arrest a nuisance under its general welfare provisions, the same as it would have to

stop an epidemic or something else harmful to the health and peace of the community. The ordinance having been upheld, the committee, chairman Hudson of the anti-vice committee said, is in position now to go to the limit in offering its services to the authorities for the enforcement of the ordinance. Dimick said: "We had anticipated the possibility of an acquittal of the man, but it will have but little effect on the situation one way or the other, because the section of the ordinance making unlawful the keeping of assignation houses and houses of prostitution has been upheld; also the section aimed against the renting and using of rooms for immoral purposes—the person who rents the room from the keeper being the guilty one."

Police and Firemen Get More Pay.

Cheyenne, Wyo.—Policemen and firemen of this city are now receiving higher pay than they have in the past, following the reappointment of C. F. Embury as chief of police and George Bates as fire chief. The chiefs of both departments receive \$125 per month under the new schedule; the fire captain and police sergeant draw \$110 per month; patrolmen on the police force receive \$100 per month. Firemen in the city department will receive from \$80 to \$100 per month, according to the recommendation of the chief and the mayor. The old administration raised the pay of the men slightly, but it was still declared to be too small. Under the new ordinance, which became effective February 1, it is believed that there will be no further difficulty in securing more good men for the police department.

Voters Approve Only Salary Raise for Police and Firemen.

Galveston, Tex.—Only one of the six proposed amendments to the charter of the city of Galveston was passed by the voters in the recent special election, that one granting authority to the board to increase the salaries of the policemen and firemen. The remaining five propositions were rejected by overwhelming majorities. The vote cast was an exceptionally light one and little interest was manifested by the voters. Less than 2,000 votes were cast throughout the city, being less than one-fourth of the qualified voters of the city. The adoption of the amendment which allows the police and fire department employees a raise in salary amounting to about \$15 a month over their former salaries, carried by about two to one. The voting against the remainder of the amendments was as heavy and in some cases more so. One of the proposed changes was defeated by a vote of about 3 to 1. This will be the last city election held for the amendment of the charter for a period of two years, the earliest possible date now being 1920. The salary raise for policemen and firemen was approved by 1,270 to 648. Other amendments proposed dealt with the fixing of salaries at higher minimums; increase of appointive power; increase in general tax rate; a bond issue for \$300,000 and salary increases for city officials.

GOVERNMENT AND FINANCE

New York Sells \$25,000,000 Bonds and Notes.

New York, N. Y.—The city of New York has sold \$5,000,000 of revenue bills, dated January 24, maturing May 24, at an average price of 4.52 per cent. In all thirty-three bids were received, totaling \$45,635,000. The successful bidders and the interest basis of each follow:

Salomon Brothers and Hutzler,	\$1,000,000	at 4.49 per cent.
Salomon Brothers and Hutzler,	\$1,000,000	at 4.51 per cent.
Salomon Brothers and Hutzler,	\$1,900,000	at 4.53 per cent.
Salomon Brothers and Hutzler,	\$720,000	at 4.55 per cent.
J. P. Morgan & Co.,	\$1,000,000	at 4.54 per cent.
Callaway, Fish & Co.,	\$75,000	at 4.55 per cent.
Callaway, Fish & Co.,	\$100,000	at 4.50 per cent.
Callaway, Fish & Co.,	\$100,000	at 4.45 per cent.
Remick, Hodges & Co.,	\$5,000	at 4.50 per cent.

Deputy controller Arthur J. Philbin, who opened the bids, said he was well satisfied with the first offering of city revenue bills made under the new administration. He added that he regarded the price received as "most satisfactory."

A few days later deputy controller Philbin sold \$20,000,000 revenue bills for the city in anticipation of tax receipts.

J. P. Morgan & Co. were the successful bidders. The notes were divided into two lots of \$10,000,000 each, the first lot maturing May 10 and the balance on May 20. The Morgan firm's bid for the \$10,000,000 of earlier maturity was on a basis yielding 4.31 per cent and the other block commanded a price netting 4.32. The sale brought the city a somewhat better price than the \$5,000,000 notes sold on January 24, when the interest basis was 4.52 per cent. Many bids were received for smaller rates of interest than those contained in the Morgan bid, the sum total of all bids received averaging an interest rate of 4.328 per cent. The lowest bidder was Salomon Brothers & Hutzler, who offered to take \$150,000 of the total amount on a 4.25 per cent basis. In announcing the successful bidder controller Craig said there were forty-six bids, most of which were "all or none" bids, and that they totaled \$146,488,000.

Morganton Has New Town Manager.

Morganton, N. C.—W. R. Patton has been appointed to succeed town manager Cain in that position. His salary is \$1,500 a year. Morganton was one of the first three cities to adopt the commission-manager form of charter.

Woman Acts as City Manager.

Beaufort, S. C.—A woman is at present holding the office of city manager in this city. City manager H. G. Otis has been "promoted" to the managership of Auburn, Me., where he has assumed his duties. The city council has designated mayor E. C. Danner to act as manager until a permanent appointment is made, authorizing him to appoint an assistant to take active charge of the manager's office. He requested Mrs. H. G. Otis, wife of the resigning manager, to act in that capacity. Mrs. Otis has accepted, and is, to all practical purposes, city manager until a permanent incumbent is found.

Norwood Wants a New Town Manager.

Norwood, Mass.—The town is seeking a new town manager to take the place of Clarence A. Bingham who recently resigned to take a similar position in Waltham. Applications, containing full details regarding qualifications and experience, are being received by the clerk of the board of selectmen, Oliver J. Barr.

Kalamazoo Votes for Manager Plan.

Kalamazoo, Mich.—Kalamazoo has voted in favor of the commission-manager form of government, including proportional representation. Ten below zero weather kept qualified voters indoors to a large extent and fewer than 3,000 votes were cast. The totals showed 2,043 for the new charter and 659 against. The new charter is one of the most advanced in the country.

City Operating Department Reorganized.

San Diego.—Manager of operation Fred M. Lockwood has effected a complete reorganization of the city operating department. He has organized the various departments under him into bureaus, with a head to each bureau. Printed instructions as to the duties and functions of heads and employees of each bureau were distributed in order that the men might learn their responsibilities and to whom they are responsible. This is the first time the department has been reorganized since its creation in 1915. The manager has placed the general office in charge of chief clerk Arthur Francis, who now takes from the burden of the manager all petty matters and a great deal of the responsibility of enforcing regulations. All heads of bureaus are to report to the manager in writing through the chief clerk. The upkeep and general administration of the city hall has been placed in charge of chief janitor John Williams. Caretakers are made responsible for the conduct and condition of the public comfort stations. These are under the head of public buildings. All inspections are to be in charge of W. H. Judy, who has been made chief inspector. He has charge of building, gas, electric, boiler and water sanitation inspection. The bureau of engineering will continue in charge of city engineer George Cromwell and all engineering work will be under his supervision. A new bureau is that of mechanics in charge of master mechanic

Fred Whitmore. He has been placed in charge of all machines, owned or operated by the city, including all pumps, motors and automobiles. Heretofore the city's automobiles have been in charge of a master chauffeur. Whitmore is **now responsible for their operation and repairs.** He also is in charge of the city's machine shops. Sewer construction and the water distributing system have been **consolidated into one bureau, with manager Lockwood as ex-officio superintendent and chief clerk Francis, assistant superintendent.** This embraces all sewer and water construction. There are several divisions, each in charge of a foreman, who is to look after his respective division only. The bureau of water conservation includes the upkeep and care of the city impounding system, in charge of supervisor R. Wueste, reporting to the manager. The bureau of streets and public lands is in charge of street superintendent Murray Loop, with the extensive yards in charge of the yard clerk stationed there. The bureau of harbors remains as it is, in charge of harbor master W. A. Mugler.

Strong Movement for City Manager.

Aberdeen, Wash.—The city council has passed an ordinance authorizing the mayor to appoint enumerators to take a census of the city. The laws of this state provide that any city having a population of 20,000 or over can become a city of the first class, and the council, believing that this city has the needed number, wishes to go up from the second class. If it is found that the city has enough population an election will be held to nominate fifteen freeholders, who will draft a charter to be submitted to the voters. There is a strong sentiment in the city at present for the election of councilmen at large and the appointment of a city manager.

TRAFFIC AND TRANSPORTATION

Open \$4,000,000 Twin Peaks Transit Tunnel.

San Francisco, Cal.—Car service is now in operation through Twin Peaks tunnel. With mayor Rolph at the motor and with appropriate celebrations, the first car was operated through the tunnel to mark the opening of regular passenger service to the district east of Twin Peaks. The event is one of the most significant and important steps in the recent history of San Francisco. It means the opening to settlement of a vast area of residential lands within the bounds of the city and twenty minutes from the heart of downtown business centers. Initial work for the construction of Twin Peaks tunnel was started nearly seven years ago. At that time the rock strata of the Twin Peaks ridge was tested and steps taken toward promotion of the enterprise. When the practicability of the project was established, the question of financing came up, which was met by the formation of an assessment district. Property owners assessed themselves for \$4,000,000, the cost of the 12,000-foot bore. This represented a levy on 16,000 parcels of land, owned by approximately 10,000 persons. The total acreage assessed in the west of Twin Peaks district is 4,153, while 660 acres east of Twin Peaks, including a portion of Eureka valley, bore \$595,316 of the expense of the project. Construction of the tunnel was commenced in November, 1914, and completed July, 1917, one month under the time limitation of the agreement. Aside from the construction of the main bore, the contract included the construction of two underground stations, the Forest Hill and Eureka valley depots. The project represents a total expenditure of \$4,250,000, including the cost of laying rails. There are already a number of residents in this new district, where lots have been subdivided to date to accommodate a population of 125,000. Assessed valuation of property in the district has advanced about \$4,000,000 during the past six years. This means an added income of \$92,000 per annum in taxes to the city, made possible only because of the coming of this transportation system. During the coming six years it is confidently expected that a vastly greater increase in revenue will be enjoyed because of the rapid development which will follow good transportation. Twin Peaks tunnel was constructed under the supervision of city engineer M. M. O'Shaughnessy.

St. Louis Has Five-Day Car Strike.

St. Louis, Mo.—The city was greatly relieved when the street cars of the United Railways resumed service after a complete tie-up lasting more than five days. Business was disorganized. The streets were crowded with jitneys, charging whatever the traffic would bear, and the city ran three municipal buses. Little violence marked the strike. The strikers, organized by the Amalgamated Association of Street and Electric Railway Employees of America, won their two main demands: Recognition by the company of the right of the men to organize; reinstatement of all men discharged since the first of the year. Provision is made in the agreement that the company shall not discriminate against any employee because of his membership in the union, and that any employee shall be free to join the union if he cares to do so. Within ten days the company and the union representatives will take up the question of hours, wages and working conditions. The company also pledges itself to receive committees from the organization at any time upon reasonable notice.

STREET CLEANING AND REFUSE DISPOSAL

Food Conservation Reduces Garbage.

New Orleans, La.—Proof that the women of New Orleans were serious when they pledged themselves to conserve food was furnished by the garbage report for January, 1918, submitted to commissioner Lafaye by Joseph A. Gleason, deputy commissioner in charge of the department of public works. In January, 1917, there were 7,694 tons of garbage collected, while in January, 1918, there were 7,416 tons collected, a difference of 248 tons. In January, 1917, there were 15,388 loads of garbage collected, as compared to 14,892 loads in January, 1918, a difference of 496 loads.

Mayor Proclaims "Snow Removal Day."

Harrisburg, Pa.—Monday, February 4, was declared "Snow Removal Day" in a proclamation issued by mayor Keister, calling upon citizens to get out with snow shovels, trucks and teams to make the streets passable for traffic. The fire hazard was one of the chief things that led the mayor to issue the proclamation. All of the narrow streets of the city where there are pavements on both sides were impassable to fire apparatus. A recent fire was extinguished only by one out of five motor trucks which was lucky enough not to stick in the drifts. The highway department because of the shortage of men and trucks was unable to cope with the unprecedented conditions. When men could be secured enough vehicles to move the snow could not be obtained. The appropriations for the moving of snow that in former winters would have been more than sufficient was long since used. Five thousand dollars has been taken from the street cleaning fund and appropriated to the snow moving job. The mayor's proclamation said:

Harrisburg's streets are snowbound to a degree never before known in the history of the city.

Car service has been disrupted; coal deliveries are made almost impossible; traffic in general is almost impossible.

In front of almost every home, extending nearly to the center of the streets, are snowbanks from six to twelve feet high.

In view of these unprecedented conditions, I, as Mayor of the City, do hereby proclaim Monday, February 4—which the Federal Fuel Administration makes a public holiday—as Snow Removal Day in Harrisburg.

I hereby call upon all men and boys, not otherwise employed on Monday, February 4, to be ready with snow shovels to clear the streets insofar as possible.

I further make public request of business concerns to donate trucks and teams to the work of removing the snow.

With motor trucks and teams on all the city streets, and with hundreds of men and boys ready to remove the snow, in a single day the city's streets can be made safe for traffic.

All owners of teams or trucks who are willing to use them Monday for this public-spirited civic work should immediately notify the office of the City Highway Department. This department will route the teams and City Commissioner William H. Lynch will supervise the work.

Public announcement of the routes and hours on which teams will be on certain streets will be made Saturday afternoon.

Trusting that we can count upon every business house and every citizen to do their duty, we urge every Harrisburger to help make Snow Removal Day in Harrisburg a complete success.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

Feb. 18-21.—ROAD SUPERINTENDENTS AND ENGINEERS OF ONTARIO. Annual conference on road construction, Toronto, Ont. W. A. McLean, deputy minister, Dept. of Public Highways, Toronto, Ont.

Feb. 20.—CAROLINA ASSOCIATION OF HIGHWAY ENGINEERS. First meeting, Chapel Hill, N. C. Secretary, N. S. Mullican, county highway engineer, Lexington, N. C.

Feb. 21, 22.—NORTH DAKOTA SOCIETY OF ENGINEERS. Tenth annual convention, Fargo, N. D. President, J. A. Ingram, Grand Forks.

Feb. 21-23.—NATIONAL SOCIETY FOR THE PROMOTION OF INDUSTRIAL EDUCATION. Eleventh annual convention, Bellevue-Stratford Hotel, Philadelphia, Pa. Asst secretary, May Allison, 140 West 42d street, New York, N. Y.

Feb. 22.—MINNESOTA JOINT ENGINEERING BOARD. Annual meeting, Duluth, Minn.

Feb. 22.—MINNESOTA SURVEYORS' AND ENGINEERS' SOCIETY. Annual convention, Duluth, Minn.

March 13.—VERMONT SOCIETY OF ENGINEERS. Annual meeting, Burlington. Secretary-treasurer, Geo. A. Reed, Montpelier, Vt.

May 13-17.—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

Lincoln Highway Association.

The annual meeting of the officers and directors of the Lincoln Highway Association was recently held in Detroit. Without a dissenting voice it was decided to increase and carry on the Lincoln Highway work as a means of first importance in furthering highway construction throughout the country by means of the Lincoln Highway as the great object lesson road and backbone of a real system of national highways.

Since the organization of the Lincoln Highway Association in 1913 Henry B. Joy has been president and actively in touch with each of the many constructive endeavors of the national body. Upon the entry of the United States into the war Mr. Joy accepted a commission in the army. He expects to sail for France, where, with the rank of lieutenant-colonel, he will serve in a business administrative capacity under Pershing. As the time of his return is speculative, Mr. Joy asked that a successor be named in his place to carry on the Lincoln Highway work.

By the unanimous choice of the directors, Mr. F. A. Seiberling, president of the Goodyear Tire and Rubber Company, of Akron, Ohio, was elected to the Lincoln Highway presidency. Mr. Seiberling has been a director of the Lincoln Highway Association for the past four years, and has always

taken a keen interest in the big work being conducted. He and his company have contributed a sum in excess of \$100,000 for road work on the desert section of the highway in Utah.

Officers and directors of the Lincoln Highway Association are extremely optimistic concerning 1918 developments upon the road. The coming year will undoubtedly see the high mark made in constructive improvement on the Lincoln Highway. Figures available at this early date indicate that approximately \$4,000,000 will be spent in actual road work.

With the exception of the presidency, no changes were made in the officers of the association. Vice-presidents Roy D. Chapin and Carl G. Fisher were re-elected, as were treasurer Emory W. Clark, secretary A. F. Bement and field secretary H. C. Ostermann.

H. F. Campbell, of Indianapolis, a founder of the Lincoln Highway Association, was elected to the board of directors of the association, and will serve on the executive committee with the following associates for the coming year: President A. F. Seiberling, vice-president Chapin, director A. Y. Gowan, director Paul Deming and secretary A. F. Bement.

Mr. Seiberling made it clear that under his direction Mr. Joy's policies would be substantially adhered to, but laid stress on the fact that the association must have a greater revenue if it was to continue and keep up with the many phases of the work developed through its success.

Under his direction an active campaign will be instituted to secure the financial support of additional "founders" from among those men and organizations in every part of the country who approve of the association's activities and see their tremendous value to the nation. Lincoln Highway founders are those individuals and organizations paying \$1,000 or more a year to aid the carrying on of the work.

Pike's Peak Ocean-to-Ocean Highway Association.

The annual convention of the Pike's Peak Ocean-to-Ocean Highway Association was held Feb. 6 and 7 at St. Joseph, Mo. The meeting was called after a referendum of directors of all state divisions.

Road problems arising out of war conditions were given first place on the program for the meeting. The year 1917 has been a notable one in the development of the Pike's Peak Ocean-to-Ocean highway. It witnessed the completion of an independent alignment from New York City to San Francisco and saw substantial progress in marking, logging, mapping, advertisement and development of the great central transcontinental route—"The Appian Way of America." There are

now eleven states which are completely organized for the Pike's Peak Ocean-to-Ocean Highway Association.

C. F. Adams of Chillicothe, Mo., was re-elected president of the association at the closing session. A. W. Henderson of Colorado Springs, Colo., was re-elected secretary-treasurer.

American Water Works Association.

The third and last meeting for the season of the New York section of the American Water Works Association will be held at the Park Avenue hotel on Wednesday, February 20, 1918. There will be a luncheon.

This meeting is to be devoted to a recital of experiences of the various communities, during the unprecedented cold weather of this winter. New high records for consumption have been established. Members are requested to come prepared to tell what their water consumption was last winter and compare it with this winter's record. The story of frozen services and thawing them out by electricity or otherwise, will be interesting, especially if costs are given. Each member is urged to tell his troubles and how he met them.

At this meeting a governor is to be elected, to take the place of Allen Hazen, whose term of office expires.

Canadian Society of Civil Engineers.

"Fuels of Canada" was the title of the chief address of the annual convention of the Canadian Society of Civil Engineers held in Montreal Jan. 22 and 23. The name of the organization was changed to the "Engineering Institute of Canada."

The following officers were elected: President, Henry H. Vaughan, Montreal; vice-presidents, T. H. White, Vancouver; J. M. R. Fairbairn, Montreal; Prof. H. E. T. Haultain, University of Toronto; R. F. Hayward, Vancouver.

New England Water Works Association.

The February meeting of the New England Water Works Association was held at the Hotel Brunswick, Copley Square, Boston, Mass., on Feb. 13. There was a discussion of "Tentative Specifications for Cast Iron Pipe and Specials." A paper on "Steam Pumping Engines" was read by Alfred O. Doane, division engineer, metropolitan water works, Boston.

New Jersey Mosquito Extermination Society.

A five-year campaign to rid New Jersey of mosquitoes was outlined at the fifth annual meeting of the State Mosquito Extermination Association, at the Hotel Traymore, Atlantic City, held Jan. 31 and Feb. 1.

The association is urging a state appropriation of \$100,000 a year for five years for the program, which has been referred to the budget committee, of which state treasurer Newton A. K. Bugbee is chairman.

The work of ridding New Jersey of the mosquito has been one-third com-

pleted, Robert E. Engle of Beach Haven, president of the Ocean County Mosquito Extermination Commission, set forth in a paper on the status of the mosquito control in the state.

Every county in New Jersey was represented at the convention. The program was opened with an address by president H. H. Brinkerhoff of Jersey City, president of the Hudson County Mosquito Extermination Commission.

Alfred Gaskill, director of the Department of Conservation and Development, delivered a paper, entitled "Mosquito Control as Prerequisite to the Urban, Agricultural and Industrial Development of New Jersey."

Frederick L. Hoffman of Newark, statistician of the Prudential Insurance Company, said that last year there were a million and a half cases and ten to twelve thousand deaths from malaria in this country. James Brooks of Glen Ridge, consulting engineer of the Essex County Mosquito Commission, told of the mosquito problem of the Upper Passaic Valley. Thomas M. Donnelly

of Jersey City, Walter R. Hudson and David Young also spoke.

New Jersey has well under control the local breeds of mosquitoes, President William Edgar Darnall of Atlantic City, set forth in a report. Dr. Darnall declared that if New Jersey were free of mosquitoes it would mean an increase of property values of \$500,000,000. "Such an outlook is in prospect," he said, "and it would be well worth an investment of \$100,000 a year for five years."

About 100,000 acres of Jersey marsh land has been drained and there are still about 200,000 acres upon which to work. The county appropriations last year totaled \$210,000 and to this sum \$15,000 was added from the state. In setting forth statistics it was stated that New Jersey might be mosquitoless at a cost of twelve cents per capita for the next five years.

Alfred Gaskill, director of the Department of Development and Conservation, with headquarters at Trenton,

(Continued on page 158.)

PERSONALS

Figg, J. P., has resigned as superintendent of the waterworks of Savannah, Ga.

E. J. Fort, chief engineer, bureau of sewers; H. H. Schmidt, chief engineer, bureau of highways, and George W. Tillson, consulting engineer to the borough president of Brooklyn, New York City, are no longer in the city's service, their positions having been abolished.

Grubmeyer, A. C., of Baltimore, is now superintendent of the municipal electric light plant of Hagerstown, Md.

Hallock, James C., deputy chief engineer of the department of streets and public improvements of Newark, N. J., has resigned to become engineer to the republic of Ecuador, South America. Mr. Hallock has spent over seven years in Ecuador, first as engineer of the state of Esmeralda and then for five years as director general of public works for the republic. He has been connected with Newark for nearly eleven years and has had charge of a number of important problems. He had complete supervision of the development of Port Newark terminal, and of the garbage collection of the city.

Hull, H. H., formerly assistant engineer, is now city engineer of Memphis, Tenn., to succeed J. H. Weatherford.

McAndrew, William P., has been re-appointed member of the city planning commission of Erie, Pa.

McStay, Arnold B., has been appointed commissioner of the department of street cleaning of New York, N. Y. He was formerly secretary of the department and later deputy commissioner.

Waite, Henry M., city manager of Dayton, O., has resigned. He is now an officer of army engineers and will have charge of rehabilitation of French and Belgian towns devastated by the war.

Weatherford, J. H., has retired from the position of city engineer of Memphis, Tenn., and opened offices as consulting engineer at 68 West Court street, in the same city. Mr. Weatherford was city engineer for over ten years, during which period almost all of the city's paved streets were improved under difficult conditions. Mr. Weatherford had charge of extensive grade crossing elimination work, the development of the separate sewer systems and the \$1,500,000 North Memphis levee system. He recently submitted plans for a \$500,000 water and rail terminal, with which project, it is understood, he will still be connected.

Main, William R., C. P. A., auditor of the Pennsylvania state highway department, has been commissioned a lieutenant in the United States Naval Reserve Corps, Paymaster's Department. Mr. Main secured leave of absence during the period of the war. Officials and employees of the department presented Mr. Main with a wrist watch. He was appointed auditor of the department on May 1, 1913.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A bond issue is soon to be voted on by Manchester, Kan., for the building of WATERWORKS. Plans for the improvement have been completed by the engineers, Riddle & Riddle.

The SEWAGE DISPOSAL PLANT of Forney, Tex., is to be improved. Plans and specifications for the work were prepared by the engineering firm of Myers & Noyes.

An ELECTRIC LIGHTING PLANT is to be built by Maddock, N. D. Preliminary plans are being prepared by the city's consulting engineer, W. E. Skinner.

A SEWERAGE SYSTEM and DISPOSAL PLANT are to be built by Abingdon, Va. Robert Gray is preparing plans and specifications for the work.

A WATER SUPPLY SYSTEM to cost about \$600,000 is to be built by Orlando, Fla. Plans for the improvement have been completed by the J. B. McCrary Co.

Hobart, Okla., is to build a new WATER SYSTEM, including a reservoir. Plans for the work have been completed by the Byrne Engineering Company.

Milwaukee, Wis., is confronted by the problem of protecting its water mains from danger of ELECTROLYSIS. It has retained E. E. Brownell as its expert to confer with representatives of the street railway company.

Bonds for \$440,000 have been voted by Globe, Ariz., for the construction of a SEWERAGE SYSTEM and the extension of the WATER SYSTEM. Plans and specifications are being prepared by the Benham Engineering Co.

Laurens, Ia., is to build sanitary SEWERS according to plans and specifications prepared by C. H. Currie.

Baxter Springs, Kan., is to construct a WATER WORKS SYSTEM to cost about \$150,000. The city's consulting engineer for the work is A. C. Moore.

A SEWAGE DISPOSAL PLANT is proposed for Horton, Kan. Preliminary plans for the improvement are being prepared by Black & Veatch.

The WATERWORKS SYSTEM of Williams, Ariz., is to be improved at a cost of \$55,000, the engineers, Olmsted & Gillelen having been retained to plan the work.

Sugar Bowl drainage district, Manatee county, Fla., is to make DRAINAGE IMPROVEMENTS. Plans and specifications have been prepared by the engineering firm of Cravens & Kimmel.

A new WATER SUPPLY is to be developed by Caldwell, Kans., at a cost of about \$100,000. The engineering firm of Burns & McDonnell has been retained by the city to prepare plans and specifications.

Wilbarger County, Vernon, Tex., is to construct a reinforced concrete BRIDGE between it and Davidson, Okla. Plans are being prepared by the engineer, C. K. Allen, of Waddell & Sons.

In an APPRAISAL of the Pennsylvania Gas Company's property, the cities of Erie, Corry and Warren, Pa., will be represented by F. A. Shaw as their expert in a board to be composed of the city's representative, one from the company and one from the state public service commission.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

CARBURETOR ON CONCRETE MIXER.

New Device for Fuel Saving on "Northwestern" Line.

The Northwestern Steel and Iron Works, Eau Claire, Wis., is calling attention to its "Twin Service" carburetor as a new and particularly welcome feature of the 1918 equipment of its popular line of "Northwestern" mixers.

This device gives the operator full control of his fuel, so that he can use either gasoline or kerosene as desired. It is claimed that this device enables a large saving in the cost of mixer fuel, and apparently is worth serious consideration in the effort to hold down production costs.

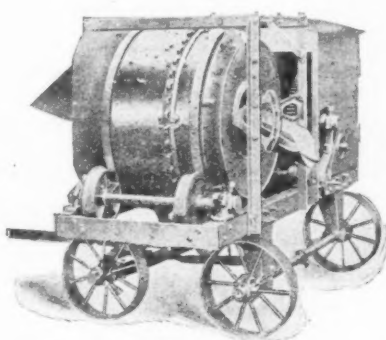
The sizes and models of mixers offered by this company for the 1918 season follow closely its line of last year. The illustration shows the end discharge mixer designed primarily for paving alleys, subways, bridge footings, etc. This model is adapted to many other uses, as it maneuvers in such close quarters that it can turn in its own length.

Special attention is called to the "fool-proof engine" and to the high sustained speed of operation—both "Northwestern" features of valuable importance in road and street work.

Five "Northwestern" mixers were used at Camp Upton, Yaphank, L. I., materially assisting to complete this—the largest camp—in record time.

The company anticipates an active season on its tile and culvert forms. The use of these, especially in road work, is effecting large savings in iron and steel as well as of railroad tonnage and car space. Another feature is the economical use of local unskilled labor.

Albert N. Shearman; "Bulk Cement for Concrete Tile Plants," by Willis F. Gillette; "The South as a Field for Manufacture of Concrete Drain Tile," by Edmund T. Perkins; "Bonus System," by P. H. Atwood; "Methods of Advertising," by Secretary J. H. Libberton; "The Relation of Investment, Overhead and Profit," by Frank J.



SPECIAL END DISCHARGE "NORTHWESTERN" CONCRETE MIXER.

Lawson; "Sewer Pipe Promotion," by Coleman Meriwether; "Sewer Pipe on Pacific Coast," by L. Y. Stayton; "Proportioning Mixtures for Concrete Pipe," by R. W. Crum.

A luncheon, a dinner, vaudeville, etc., were the entertainment features of the well-balanced program.

The association contemplates giving greater assistance to its members during the coming year. Promotional booklets have been prepared and electros for local newspaper advertising have been set up ready for distribution in quantities at cost to all members of the association.

Serbian Need of American Products.

—According to reports from the Bureau of Foreign and Domestic Commerce, immediately upon the recovery of Serbian territory now in the hands of the enemy it will be necessary to supply the remaining civilian population of that territory with relief in the shape of most necessary tools, food-stuffs, medicinal products, agricultural implements, live stock, raw materials for factories, household utensils, and the like. Before the war Serbia was largely dependent upon the central powers for these things, and while it will prove difficult for the Serbian merchants to adapt themselves to the usages of the allied markets, especially our own, a complete willingness and desire to do so is assured. American manufacturers may therefore anticipate with the liberation of captured Serbian territory a market for the following articles: Tractors, spades, picks, axes,

shovels, wagons, cart axles and wheels, spray pumps, copper sulphate, pig iron, tin plate, motor trucks, chains, measuring instruments, rails, iron and steel bars, galvanized sheets, wire, lubricants, cordage, coke, calcium carbide and barges.

The Pittsburgh Wood Preserving Co., Ohio Wood Preserving Co., Michigan Wood Preserving Co., and Acme Tie Co. have moved their general offices to the Century building, Pittsburgh, Pa.

American Wood Preservers' Association.

The fourteenth annual meeting of the American Wood Preservers' Association was recently held in Chicago. The principal topics discussed were wood blocks for street paving and interior flooring and changes in specifications for oil for timber treatment. The following officers were elected: President, Morris K. Trumbull, vice-president, National Lumber & Creosoting Co.; vice-presidents, J. B. Card and A. R. Joyce; secretary, F. J. Angier, Baltimore & Ohio R. R., Baltimore, Md. The next meeting of the association will be held in St. Louis.

The Portland Cement Association, Chicago, Ill., announces that George A. Ricker, formerly advisory engineer and later highway engineer of the association, is now in charge of the Washington, D. C., office of the association located in the Union Trust building. Prior to joining the forces of the association, Mr. Ricker was first deputy commissioner of highways for the state of New York, which position he held from July, 1913, to December, 1914. Mr. Ricker has been identified with many engineering projects. Among others he was associated with the Pan-American Exposition, International Street Railway Co., Buffalo; served as chief engineer for the Niagara Gorge Railway Co., Buffalo, in the design and construction of the road and was consulting engineer for the Oswego Bridge Co., and for Spencer, Trask & Co., the well-known New York bankers.

The Four Wheel Drive Automobile Co., Clintonville, Wis., is executing a Government contract involving \$50,000,000 for military trucks. It has declared a stock dividend of 50 per cent. The capital stock was increased from \$500,000 to \$1,000,000 a year ago and will be increased to \$1,500,000 at once. Officers and directors were re-elected. J. D. Cotton was elected a director to fill the vacancy caused by the death of John Kalmes, treasurer.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain constant: Quotations: Chicago, 4-inch, class B and heavier, \$57.30; 6-inch, \$54.30. New York, 4-inch, class B and heavier, \$58.35; 6-inch, \$55.35; 3-inch, \$65.35. Birmingham, 4-inch, class B and heavier, \$52; 6-inch, \$49; class A \$1 extra.

American Concrete Pipe Association.

The annual conference and convention of the American Concrete Pipe Association was held Feb. 8 and 9 at the Hotel Sherman, Chicago, Ill., and was well-attended. The program was prepared to make the meetings valuable for bringing out ideas for increasing efficiency of the plants.

Among the papers read were: "Best Method of Curing Pipe and Tile," by

NEWS OF THE SOCIETIES

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spoke on "Mosquito Control as a Pre-Requisite to Urban and Agriculture Development." Sanitary engineer of the Department of Health of New York, Eugene Winship, delivered an address on the "Progress of Mosquito Control." Harold Eaton, former inspector for the Atlantic County Commission, talked on the subject of the "Proper Application of Mechanics to Mosquito Control."

One of the foremost means that must be adopted to halt the ravages of the pest is to "study it on the wing," according to Dr. Thomas J. Headlee, State entomologist, who addressed the convention upon "Mosquito Distribution as a Factor in Mosquito Control." W. E. Bretton, State entomologist of Connecticut, warned the delegates not to fear "carping criticism of a skeptical world." The meeting passed a resolution, which it wired to U. S. Surgeon-General Gorgas, "respectfully suggesting the urgent necessity of a campaign to thoroughly safeguard the military forces and industrial workers against the serious risk." There were more than a hundred present at the sessions.

Robert F. Engle, of Beach Haven, president of the Ocean County Mosquito Extermination Commission, was elected president at the annual election. Other officers are: First vice-president, Walter R. Hudson, of Paterson; second vice-president, A. J. Rider, of Hamonton; secretary-treasurer, Thomas R. Headlee, of New Brunswick; executive committee, Jos. Camp, Pierces, Uric Dahlgren, Princeton, Ralph H. Hunt, East Orange, Dr. William Edgar Darnall, Atlantic City, Dr. William Williams, Rutherford, and General H. H. Brinkerhoff, of Jersey City. Atlantic City will probably get the next convention of the association.

Ohio Engineering Society.

The following are new officers of the Ohio Engineering Society: President, Dean Thomas J. Lowell, Ada; vice-president, Ed. S. Smith, Youngstown; secretary-treasurer, John Laylin, Norwalk; trustees, A. R. Taylor, Findlay; W. C. Fawcett, C. E. Fawcett, C. E. Sherman and C. T. Morris, Columbus, and Harwood Lersch, Washington.

Kansas Engineering Society.

The Kansas Engineering Society recently held its tenth annual convention at the University of Kansas, at Lawrence, in two three-session days. Nearly a hundred engineers were present. Con Buck, vice-president of the society, opened the meetings in the absence of president H. B. Walker, of Manhattan.

The committee on paving reported, with particular reference to the service of brick, bituminous concrete and concrete. Professor F. E. Johnson, of the university engineering school, described the developments of the electrical utilities of the state. N. T. Veatch spoke on sewerage problems.

J. C. Wonders, district engineer for the department of agriculture, with offices in Omaha, Nebraska, discussed federal aid in road building in Kansas and told of eleven road projects that are being put under way in the state. In another talk on this W. S. Gearhart, state highway engineer, urged that road building be carried forward during the war, except at harvest time, when the road building forces should be diverted to the fields. Professor H. A. Rice, of K. U. school of engineering, made a report of the study of the state water commission on flood and drainage problems. Officers elected at the closing sessions were Con M. Buck, of Topeka, president; Dean A. A. Potter, of the state agricultural college of Manhattan, vice-president, and L. B. Smith, of Topeka, secretary.

Association of Ohio Technical Societies.

Vigorous efforts to meet the need of unity among the engineering profession in the state resulted in the permanent organization of the Association of Ohio Technical Societies at a meeting held in Columbus Jan. 29. Every local society and local section of national societies but one was represented at the meeting. The Columbus chapter of the American Institute of Architects urged that it would be to the mutual advantage of engineers and architects if each profession made use of the experience of the other. The twenty delegates passed resolutions indorsing the "ten cardinal principles" of the committee on engineering co-operation; indorsing the Cleveland Engineering Society committee's plan of requiring membership in a local society as prerequisite to admittance in a national society; and urging that local societies work for the appointing of at least one engineer to any public board where engineering experience would be of service. State regulation of engineering practice by statutes prepared by engineers was urged.

Clyde T. Morris, professor of civil engineering of Ohio State University, was chosen president and C. E. Drayer, Cleveland, secretary.

Firemen's Association of Pennsylvania.

The thousands of firemen in the state were recently called on to aid national, state and municipal authorities to combat incendiaries. The call was sent out by judge Eugene C. Bonniwell, president of the Firemen's Association of Pennsylvania, to members of the organization. He asserted that the firemen must be the keystone of the state defense against "treachery and destruction," and expressed the hope that during the present year every firehouse in Pennsylvania "shall be a beacon light of patriotism to its community, an incentive to the youth who are called to fight for our flag and a constant monitor that thrift, food conservation, economy in fuel and a dauntless courage."

For that purpose Pennsylvania has

been divided into seventeen districts, with the ablest fireman in each appointed as chairman. His duty will be to organize the fire companies within the district into a close-knit association for "mutual support, the detection of incendiaryism and the improvement of conditions about factories and plants, as well as to aid in the sale of Liberty Bonds and thrift stamps." Each fireman also is urged to make it his duty to wear, besides the insignia of the association, his Red Cross emblem. If not already a member, he is asked to join immediately.

Highway Traffic Association of New York State.

A public meeting of the Highway Traffic Association of the State of New York will be held at the Automobile Club of America 247 W. 54th street, New York City, at 8:30 p. m., Tuesday, Feb. 19.

William S. Conning, chairman, motor truck transportation committee, Connecticut State Council of National Defense, will speak on the subject "Practical Operation of the Return Loads Bureaus of Connecticut."

Providence Engineering Society.

The February program of the Providence Engineering Society contains a number of attractive meetings: Feb. 13, Power Section, "Elimination of Fuel Wastes in Manufacturing Plants"; Feb. 20, "Water Power Development in New England," by Henry I. Harriman, of Chace & Harriman, president of the Boston Chamber of Commerce. This talk will be illustrated. Feb. 27, Municipal Engineering Section, "Electrolysis Mitigation" (illustrated and with exhibits), by James A. McKenna, city engineer's department, Providence.

March 4 will be "members' night" and will be marked by special entertainment features. Governor R. Livingston Beekman will be speaker of the evening.

Michigan Engineering Society.

Declaring that the rapid completion of trunk line highways throughout the state and nation, to be traversed by passenger autos and freight trucks, will be a vital factor in relieving freight congestion and aid in meeting distribution problems generally, Frank F. Rogers, state highway commissioner, addressing the convention of Michigan engineers, recommended no curtailment of road building programs contemplated by the counties of the state. This address was the principal feature of the convention of the Michigan Engineering Society recently held in Grand Rapids.

The following officers were elected: President, E. D. Rich, Lansing; vice-president, L. C. Smith, Lansing; secretary, W. W. Cox, Kalamazoo; treasurer, A. J. Decker, Ann Arbor; directors, R. J. Rumsey, Grand Rapids; C. W. Hubbell, Detroit, and C. T. Johnson, Ann Arbor.